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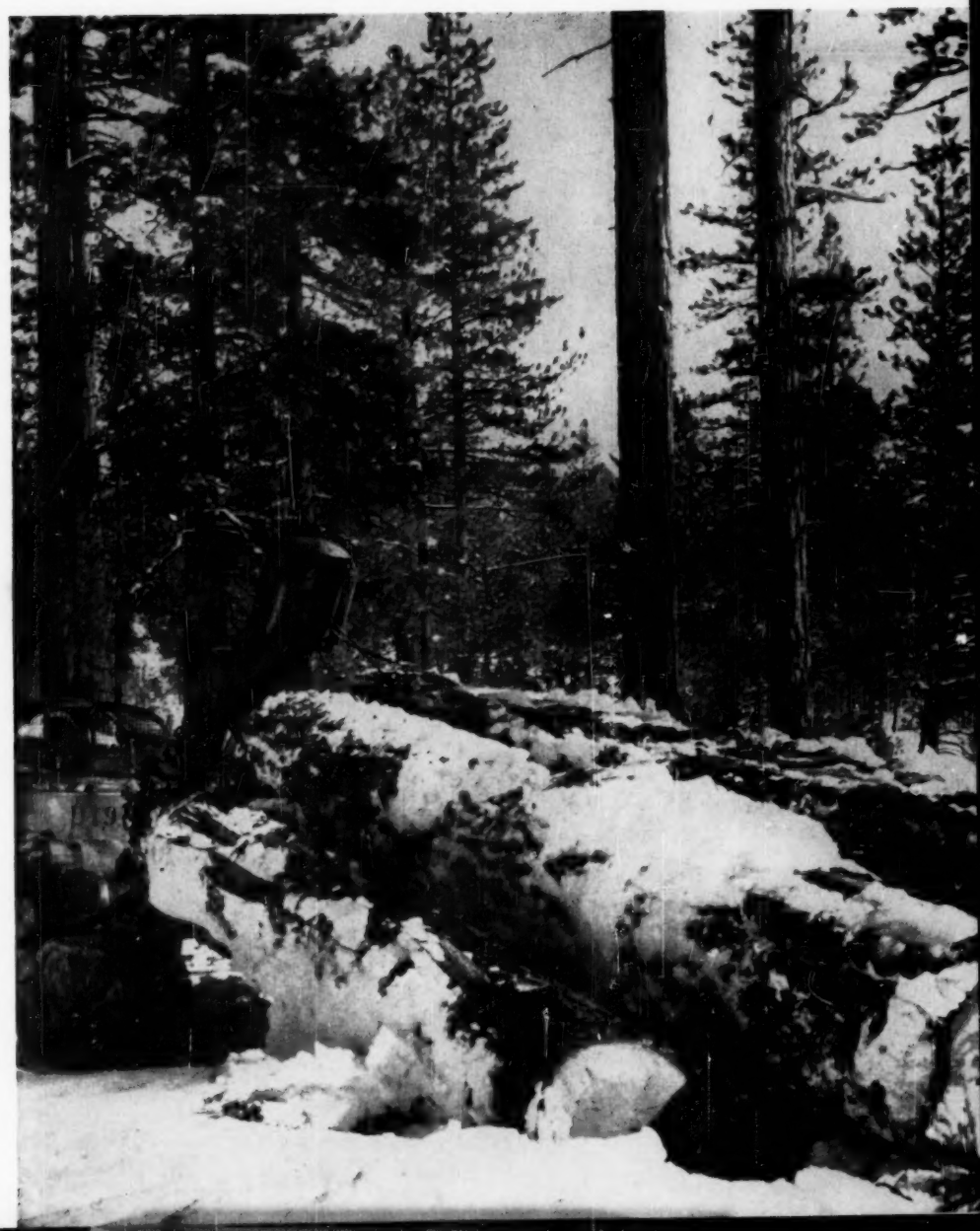
JANUARY 1950



SOCIETY OF AMERICAN FORESTERS 1900

Volume 48
Number 1

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Journal of Forestry

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Mr. Lloyd Thorpe,
686 Dexter Horton Building,
Seattle 4, Washington.

Dear Mr. Thorpe:

The Journal of Forestry is read by every industrial forester, as well as by a great many people interested in all phases of forest activities. This publication is probably the only one filed by the industrial forester for future reference to certain articles in each issue.

What applies to the reference on articles in the Journal could very well apply to the advertisements contained in the publication. These advertisements could be for all supplies from the finest drafting pen to the largest earth moving piece of machinery. I also feel that the manufacturers of woods clothing, camping equipment, canoes, guns, fishing tackle, and a great many other articles used in the woods could well afford to advertise in our Journal and get their products before the top men in woodland activities, whether it be managing forest products operations, or directing recreational work in our schools and forests.

As the Journal is the outstanding publication for all foresters, and as we all wish to make it bigger and better and self-supporting, financially, I would deem it very proper to request that all readers when making, or recommending purchases of any kind, that they favor those business concerns that advertise in our Journal. This is important today more than ever, as I dare say that 95% of all timberland operators, and all the top executives directing woods operations, are trained foresters, and subscribers to the Journal.

I do stress, however, the advisability of our Journal carrying advertising of only reliable concerns that will stand behind the articles advertised.

Sincerely,

T. W. Earle, President,
Gair Woodlands Corporation.

TWE/A

This is one of a series of advertisements published by the Society of American Foresters for the purpose of acquainting the membership with the advertising potentialities of their JOURNAL OF FORESTRY.

Journal of Forestry

Official Organ of the Society of American Foresters

Charles F. Evans is New S.A.F. President; Results of the Recent Council Election

THE REGULAR biennial election on December 10, 1949, advanced Charles F. Evans of Atlanta, Ga., from vice president to president of the Society of American Foresters. He succeeds Clyde S. Martin of Tacoma, Wash., who was not a candidate for reelection.

Clarence S. Herr of Berlin, N. H., was elected vice president, succeeding Mr. Evans.

The Council

The other members elected to the Council for the two-year term 1950-1951 in addition to Mr. Evans and Mr. Herr are as follows:

Frederick H. Brundage, Harbor Plywood Company, Portland, Ore. (Columbia River Section.)

Dwight B. Demeritt, manager of woodlands, Dead River Company, Bangor, Maine. (New England Section.)

Stanley G. Fontanna, deputy director, Michigan Department of Conservation, Lansing, Mich. (Central States Section.)

CLYDE S. MARTIN
Retiring President

Frank H. Kaufert, chief, School of Forestry, University of Minnesota, St. Paul, Minn. (Upper Mississippi Valley Section.)

C. Otto Lindh, regional forester, U. S. Forest Service, Albuquerque, N. Mex. (Southwestern Section.)

Gordon D. Marckworth, dean, College of Forestry, University of Washington, Seattle, Wash. (Puget Sound Section.)

CHARLES F. EVANS
President Elect

Richard E. McArdle, assistant chief, U. S. Forest Service, Washington, D. C. (Washington Section.)

DeWitt Nelson, state forester, California Department of Natural Resources, Sacramento, Calif. (Northern California Section.)

Earl Porter, Woodlands Department, International Paper Company, Mobile, Ala. (Southeastern Section.)

Charles F. Evans

Mr. Evans is assistant regional forester for the U. S. Forest Service in Atlanta, Ga. Born February 26, 1885, at Muscoda, Wis., he received the B.A. degree from the University of Wisconsin, and the M.F. degree from Yale.

Entering the Forest Service in 1912 he is now completing 37 years of forestry work, 22 years of which have been spent in the southern region, largely in cooperative assistance in state and private forestry.

He joined the Society in 1921, and was elected a Senior Member (now Member) in 1928. He has served as chairman of the Appalachian, Gulf States, and Southeastern Sections of the Society; was elected a member of the Council for the term 1946-1947, and vice president for the term 1948-1949.

CLARENCE S. HERR.
Vice President Elect

Clarence S. Herr

Mr. Herr is resident woods manager for the Brown Company, Berlin, N. H. Born September 26, 1901, at Mayton, Pa., he was graduated in forestry from the Pennsylvania State College in 1925. His M.S. degree in forestry was awarded by Harvard University in 1930.

After ten years as extension for-

ester in northern New Hampshire, he entered the employ of the Brown Company in 1939, and was promoted to resident woods manager in 1946.

He became a Junior Member of the Society in 1926 and a full Member in 1931. He has served as secretary-treasurer, vice chairman, and chairman of the New England Section; was elected to the Council for the two-year term 1946-1947, and was reelected for 1948-1949.

Mr. Herr is the second industrial forester in the history of the Society to be elected vice president. The first was Clyde Martin of Weyerhaeuser Timber Company, Tacoma, Wash., who was elected vice president for 1946-1947, and who was advanced to president for 1948-1949.

Tribute to Mr. Martin

At the national meeting of the Society held in Seattle, Wash., October 11-15, 1949, the Council adopted the following resolution in recognition of Clyde S. Martin's services as president.

At the conclusion of its term of office the Council, which has been privileged to serve with retiring President Clyde Martin, wishes to express its deep appreciation for his leadership and ability in conducting the affairs of the Society. Mr. Martin brought a fresh and realistic viewpoint to the work of the organization. His numerous personal visits to the Sections, and frequent letters to them about Society problems and the efforts of the Council to solve them, strengthened the morale and unity of our entire membership. This stimulus to the interest and responsibility of all S.A.F. men greatly aided the progress of the past two years.

The Society has been placed upon a sound financial footing, with higher dues, while continuing its steady and gratifying increase in membership. Many important activities have been carried forward, such as the History of American Forestry, adoption of the Code of Ethics, and the development of local Chapters.

The members of the Council have felt the lift of strong, steady leadership from our president; and we want to assure him of our great pleasure and satisfaction in serving with him.

In his years of service to the Society, Mr. Martin served as chairman of the Columbia River and Puget Sound Sections, as vice president of the Society during the term 1946-1947, and president in 1948-1949.

The Journal's New Look

FOR SEVERAL years the Council of the Society has had under advisement a proposal to increase the page size of the JOURNAL in order to permit more flexibility in publishing tables, graphs, photographs, and other figures. In addition, the Council in its desire to obtain more revenue for the Society from JOURNAL advertising has given long consideration to the opportunities for better advertising display afforded by a page size larger than the one which had been used since 1939.

At its meeting in Seattle last October, the Council authorized such changes in JOURNAL format as could economically be made in order to obtain the foregoing advantages.

The JOURNAL's new look was not arrived at hastily. Numerous possibilities for improving its appearance and readability were studied and compared. The final result is a compromise between expense and aspiration.

For those who preferred the JOURNAL as it was, we point out that the type face, type size, and general style remain the same. Even use of a three-column page is not an innovation because it had been tried out for the past year in the *Forestry News* section. In short, the changes made are not for the purpose of novelty, but have a practical two-fold objective: (1) to improve the presentation of editorial content; (2) to afford opportunities for increased revenue.

A magazine — whether popular literary, or technical — is simply a medium for presenting information or entertainment. It can have a most attractive appearance, yet editorially be dull and uninspiring. The JOURNAL's new format will have failed in its purpose unless improvement can also be made in the kind of articles published in it. This improvement, then, is the next major goal. The editorial board will continue to do its best, but its best will not be enough unless our readers cooperate by supplying more and better contributions on a wider variety of subjects.

Contrary to widespread belief among some foresters, it does not require an Act of Congress to get an article published in the JOURNAL! All that is expected of a contribution is that it be reasonably well written, reasonably interesting and original, and reasonably concise. The editorial board will in turn be reasonably understanding and helpful when reviewing it.

New contributors are especially welcome. Foresters, and workers in related fields, who have never or rarely submitted a paper to the JOURNAL are urged to do so if they have something significant to say and will say it in an interesting manner.

If you yourself, dear reader, have no matter of burning importance to submit for publication, perhaps you can suggest some subject or field of practice which should be more adequately presented in the JOURNAL. If so, please tell us about it. But remember that it is not sufficient to complain that too few articles on certain subjects are published. Let us have both your suggested topic and the name of the person who, in your opinion, is qualified to write about it. And remember also that we cannot publish what we do not get. An editor's file is cluttered with broken promises of articles which were never forthcoming.

With this volume the JOURNAL begins its thirty-fifth year of publication under its present name. However, it is in reality volume 48 because the JOURNAL is the outgrowth of the old *Forestry Quarterly* started in 1902. During all those years the Society has aimed to publish an organ that would provide authentic and timely information about the development of the techniques and practices of forestry in America. The JOURNAL is still sticking to that job.

The Rate of Interest in Forest Management

Sam Guttenberg

Forest economist, Southern Forest Experiment Station, New Orleans, La.

The long-range planning involved in forestry makes the problem of interest rates important to the forest manager. What is the best land to buy? The optimum growing stock? How much money should be spent on fire protection? The author reviews the thinking of economic theorists on interest as it applies to questions like these.

UNLESS ONE can visualize an economy in which human and material resources are present in unlimited quantities, it is necessary that there be a rate of interest that will restrict and regulate the use of capital. "Interest," says Henderson, "separates the sheep from the goats. It serves as a screen, by means of which capital projects are sifted, and through which only those are allowed to pass which will benefit the future in a high degree. For this essential purpose it is hard to imagine how a better instrument could be devised." (*12*, pp. 129-130.)

This function of interest as applied to an economy in its entirety applies equally to the individual—the farmer who has his labor to apportion among various jobs, or the corporation endeavoring to use its assets in such a manner as to secure the greatest returns over the long run.

The strong influence of the interest rate upon forest management decisions is often neither appreciated nor understood. A reduction in interest rate from 6 to 4 percent adds 50 percent to the value of a durable asset, other factors remaining unchanged. What is even more to the point, a change in rate of interest results in a change in the relative attractiveness of different forest management practices. A high rate will encourage investment in quickly returning incomes (forest liquidation); a low rate will encourage investment in opportunities which yield deferred returns (sustained yield) (*9*, pp. 142-143).

Before the forest manager can choose a suitable rate of interest, he must understand clearly what interest is. As ordinarily understood, interest is the charge for the use of money, the rate being the reward for parting with it in the form of currency for a specified period. This common definition of interest disguises the fact that the term as used by the forester may cover one or more of three concepts and is closely allied to a fourth.

Pure rate (neutral, safe, risk-free, or time-valuation rate of interest) is the rate on the use of capital essentially devoid of any risk of loss (*5*, p. 26). The term has the further implication that the value of money remains unaltered (*4*, p. 501).

Risk rate can be expressed as the premium necessary to insure the owner against loss of income (*14*, 8). Once the capital expenditure is made, its value is determined not by the size of the initial investment but by the income it is capable of producing. It should be understood at this point that loss of income and loss of capital are one and the same thing. For each unit loss of income there is a corresponding loss of capital value until zero income and zero capital value are reached.

Profit rate is that portion of the interest factor that induces the owner of capital to move from investment channels of low returns and low risks to those of higher returns and higher risks. Knight points out, "It is of the essence of the situation that the profit is in the future and uncertain when the decision is made and hence it is the *prospect* or *estimated probability* of profit which 'moves men's wills'" (*14*, p. 363).

To include profit as a component of interest may appear to be a departure from traditional economic theory. However, the subject of this paper is interest not purely as the economic theorist defines it, but as it is viewed by the businessman, including the forest manager—a return on investments, which may include profit as well as pure interest. To separate risk and profit is also a departure from tradition. It is true that in most cases in real life the two cannot be identified separately. In the present analysis of the behavior of interest, however, the separation permits clearer exposition.

A fourth concept, *individual time-preference*, is the premium placed by the individual upon present as compared with future goods. An individual's time-preference may be so high that he can scarcely afford to postpone the use of any goods now available to him; he demands an excessively high payment for waiting. The time-prerence concept is related to interest in that it is one factor determining the amount of capital that will be made available by individuals at designated rates of interest. Where individual time-preference is higher than going interest rates, it may become the controlling rate in the forest-management decision.

Pure Rate

The question often arises whether we may use a single, overall rate of interest for the diversified problems of forest management. ". . . Interest from the standpoint of forest management is the price that any particular forest owner has to pay for the use of capital if he is a borrower, or that he can secure for the use of capital if he is in a position to be a lender. The interest rate used in forestry must, therefore, vary absolutely in accordance with the situation of each individual owner" (*18*, p. 84). Nevertheless there is a wide field in which the pure rate, as a uniform rate, can become a useful tool for the forester.

The pure rate fluctuates in a very restricted range over amazingly long periods of time. This is indicated by prevailing public interest rates in the last few centuries. In the seventeenth century, several Swiss cantons passed laws making void all loans at less than

4 percent, and for many years the rate hovered close to this figure or even dipped below it. In the middle of the next century, Holland and England were able to borrow at about 3 percent (*21*, vol. 2, p. 32), and British consols in the nineteenth century averaged approximately 3.28 percent (*20*, p. 765).

The interest yield of government securities is usually the lowest of all interest rates in a geographic area of stable political condition. The factors of very ready marketability, negligible risk, and minimum requirements as to management all contribute to low yield (*10*, p. 114). Because of this and the fact that government rates tend to be stable, the usual approach to hypothesizing the pure rate of interest has been to go back to the previous century and determine the average yield on government securities. This method is conservative at best, and to use it today would be to ignore the present public debt with its considerable influence on the pure rate. Older economic theory tied the pure rate to individual time-preference. Modern though departs from this concept. After all, what is the time-preference of an insurance company, bank, or corporation? Usually the federal government issues bonds, which are sold largely to banks that may use them as part of the financial reserve which they are legally obliged to carry. In times of stress, a strong government can almost force large investors to buy its securities (*3*, p. 39). Keynes (*13*) discusses fully the manipulation of interest rates by strong governments.

The best available basis for the pure rate of interest is that provided by the relationship between the carrying charge of approximately 5 billion dollars on our national debt (*2*) and the total debt of 256 billions. The resulting figure of 2 percent gives us a relatively stable figure for hypothesizing the pure rate.

This 2 percent rate can be expected to maintain itself over an extended period of time. The federal budget at present is fluctuating around 40 billion dollars. The carrying charge on the public debt approximates one-eighth of the budget. Three other items, national defense, veterans' services and benefits, and international affairs and finance, compose over 50 percent of the budget (*2*). If these three items shrink in size, debt service will assume a larger and larger percentage of the total budget. The present carrying charge on the national debt exceeds the total annual net receipts of the federal government in each year prior to 1940 except three (*1*). To keep the tax burden moderate and to continue public service, it seems certain that the overall rate on the public debt will have to be held at a 2 percent level or manipulated downwards.

However, the rate probably will not go much lower within the next several decades, since the general demand for funds in the national economy limits the extent to which even a strong government can drive the rate downward. Moreover, it is difficult to foresee any material change in our national-debt structure for the next few decades. Large national debt and low interest rates on federal securities appear to be with us for some time.

The primary field of use of the pure rate is in evaluating public expenditure of funds where risk is negligible. Where benefits will be deferred over long periods of time, it is not enough to say that the work contemplated is in the public interest of future generations. Public funds are a scarce commodity, even in an economy of abundance. It is in the best interests of the public, when alternative long-range forest and other types of programs are contemplated, to discount the net benefits (including timber, recreation, wildlife, range, and watershed values) of these programs at the pure rate of interest in order to evaluate their benefits to the community. It should not be inferred that public investments are riskless. In some cases, the combination of acquired knowledge, experience, and large-scale effort makes the over-all risk for a given program negligible. On the other hand, where knowledge and experience are limited, risk needs to be recognized; this point will be developed later.

Two examples of the use of the pure rate follow (risk is assumed to be negligible):

1. A given amount of funds is available for large-scale, long-term public acquisition of productive forest lands. Should large areas of medium site be selected, or smaller areas of good site?

2. It is often assumed that only in public forests will it be economical to grow extremely large and old trees as a supplement to the financially attractive sizes and ages grown by private concerns. What is the maximum size and age of trees that the public can grow?

Both these problems may be resolved with the help of the pure rate of interest. In the first example, with due allowance for the intangible returns, that land will be acquired whose value, capitalized at the pure rate, is the greater. In the second example, with similar allowance for intangibles, that rotation will be chosen which will just return the pure rate on the last few dollars of necessary investment.

Risk Rate

There are two principal types of risk: insurable and noninsurable. Examples of insurable risks are personal liability in operating automotive equipment and the risk of fire in a sawmill. The costs of insuring against such risks are costs of doing business and have nothing to do with interest rates. Here we are concerned with the noninsurable risks which every business must bear by itself and which influence the rate of return that should be considered appropriate in making investment decisions.

The noninsurable risks which are the sole concern here are analagous to insurable risks in one respect: the manner of determing an allowance for the risk in each case is about the same. Thus, the risk rate is analogous to that part of an insurance premium which covers risk and should be calculated in a similar manner (*9*); for an example in forestry of this approach, see Shepard (*17*).

"The fundamental principle of insurance is the distribution of losses, in accordance with the law of averages, so that the burden of loss does not fall heavily on the individual. . . . The probability of loss, then, determines the rate of premium for each insured risk.

"To be satisfactory, rates . . . must meet three essential qualifications. These are:

"1. Adequacy: they must be high enough to cover all losses and legitimate expenses. . . .

"2. Fairness: it is obvious that extremely hazardous risks should pay a higher rate than safe ones. . . .

"3. Consistency: risks of equivalent hazard should have the same rate" (*19*, p. 701).

The noninsurable risks in forest management may be considered under three broad headings: protection, operation, and marketing.

Protection concerns itself with wildfires, insects, disease, trespass, uncontrolled grazing, and mechanical damage from ice, snow, hail, and wind storms. The losses from these destructive agencies as observed over extensive areas of unmanaged land overstate the real risk on managed lands. Fires such as the Tillamook burn in Oregon in 1933, diseases such as the chestnut blight, spectacular Dendroctonus damage in overmature coniferous stands, and calamitous storms such as the New England hurricane of 1938 are often publicized to such an extent that people consider forestry a very risky business. Over the years and in a wide territory, however, such catastrophies are rare, even in unmanaged stands. In managed, operating forests of large acreage (such as tracts of 50,000 acres or more in the South) under sustained yield, such risks are reduced to a relatively low point.

In such holdings, overmature trees subject to insect and disease attack are being eliminated, trespass is guarded against at moderate cost, and most fire or storm losses are offset by salvage cutting of the damaged trees. Just as insurance firms usually pay off on the basis of actual loss and rarely on the present worth of expected values, so insect-killed pine in managed stands, as long as it is harvested, represents no loss, though, of course, salvage may occasion an extra cost.

It is in the smaller acreages that risk is usually high. In such properties, even though the damaged timber is large enough to be marketable, salvage may be impossible because the volume is too small to attract purchasers.

Furthermore, risk is high for both large and small properties where much of the forest is in the seedling and sapling stages. Practically all the value is an expected one, noninsurable in the United States today, and with no salvage value. In such cases, management can be extremely risky and the owner should understand that his investment may be highly speculative.

The second main element of risk arises from the uncertainty of obtaining labor at the time and in the quantities needed for cutting. Particularly for the owner of 200 to 2,000 acres on which cutting is intermittent, this operating risk becomes significant. The owner may very well find it impossible to carry on an operation for lack of available labor. Mortality cannot be easily anticipated, and salvage cutting is often impossible when conditions demand it. The large owner with a permanent labor force has little or no operating risk.

The third element of risk is associated with market and price uncertainties in the long future which forestry must consider, and the type and availablity of markets in the near future. Risks of the far future are borne by forestry in common with other businesses with highly durable capital. Risks of the shorter run are highest for the small owner with undiversified outlets. Where outlets are few, the forest owner who produces only stumpage or logs may be at the mercy of the processor.

A number of factors, however, may lessen the marketing risk. Forest products can be stored on the stump for many years. Diversification of use obeys the basic principle of insurance in dispersing risk and thus reducing chance of loss. The owner with access to diversified outlets can protect himself against loss of market and price changes. The forest owner with the least marketing risk is one who also owns diversified manufacturing facilities.

With respect to these three types of risk, the larger forest owners are at an advantage because they can in effect write their own insurance for a substantial part of the risk. The combination of large acreage, permanent labor force, integrated utilization, and management under sustained yield reduces risk of loss. Parts of the cost of roads, fire protection, logging equipment, and other expense items can be considered as insurance premiums in that they tend to eliminate loss. For such properties, the risk factor is low.

In many cases for the small owner, risk will be high. The rate must be based on and take into consideration a combination of the quality of fire protection provided in the locality; composition of the stand; size, constancy, and availability of the labor force; and number, distance, and diversity of the wood-using outlets in the area. In the case of small, badly located, poorly stocked holdings, the risk factor alone can preclude the possibilities of forestry practice.

How shall the risk rate be determined? Just as foresters are compelled to make estimates of future returns, so they can evaluate the risk rate from the elements of risk (*11*, pp. 224-225). This rate should then be added to the pure rate in cases where the probability of loss is moderate.[1] Where extreme risks are involved, the resulting high rate will cause capital values to become almost ridiculously small. This is a mathematical way of saying that the venture is highly speculative (*8*, p. 406).

The risk rate comes into play where alternatives involving risk are to be compared. If the risks be-

[1]Fisher (*8*, p. 278) suggests a method of calculating the risk rate which amounts to the following:

$$\frac{\text{Interest rate including risk}}{\text{Pure rate of interest}} = \frac{}{\text{1 minus the chance of loss.}}$$

Thus, if the chance of loss is 1 in 5, or 0.2, the interest rate including risk is 2.5 percent.

tween alternatives are not equal, then the effect of this inequality upon the interest rates must be determined before a comparison is made.

For example, a prospective investor has two alternatives: a forest enterprise expected to yield 3½ percent over 20 years, or a 20-year rural mortgage expected to return 4 percent. An appraisal of the relative risks indicates that the mortgage involves a higher risk, the difference being equal to about one percent interest. Therefore the forest investment is to be preferred, its lower rate of return notwithstanding.

For another example, take the case of government projects where knowledge and experience are limited and therefore risk cannot be considered negligible. Such a project was the prairie plains shelterbelt program; when the venture was first advocated, there was considerable doubt as to its probable success. In evaluating costs and benefits of projects of this nature, one may properly use an interest rate including risk.

In practice, while the private forest manager must often appraise relative risks, he is not called upon to use a rate of interest composed solely of the pure rate plus the risk rate. Profit, too, enters in.

Profit Rate

When the profit rate is included as an element in the rate of interest, it is ordinarily added, along with the risk rate, to the pure rate as a base. It is important to emphasize that the profit is in the future and uncertain when the decision is made. Therefore in evaluating alternatives with profit included in the interest rate, one uses the forecast profit as a measure of merit.

The element of time has the utmost influence on the profit rate, especially in forestry, where a single decision may commit management to a given course for many years. Over indefinitely long periods of time, profit margins tend to be reduced to small size, either because of the bidding up of market price of the capital goods necessary to produce the profit, or because of competitive production which lowers the price of the finished goods. The rates of profit for a business planned to last 10 years and one to last 20 years are not directly comparable (*11*).

"It might or might not be reasonable to expect an interest return of 6 percent at a compound rate . . . to run for 50 years, but it would certainly be unusual if obtained. The man who might invest in such a venture, with the expectation of obtaining a steady 3 percent rate of return, would probably demand 6 percent if he were making a short-term loan such as a mortgage. In the case of the mortgage, his interest would be paid to him annually . . . and he would have to seek reinvestment for this money as it was paid to him. To make such reinvestment would take time, and this would be an expense and probably entail loss of interest for a longer or shorter period. . . . When long-term financing is put into effect at the compound rate of 3 or 4 percent, the element of risk is, in theory at least, wiped out. The assumption is that the investment will automatically reinvest all earnings and pay the steady rate that has been fixed. This assumption is not made, nor can it be said to hold, for ordinary investments at what are considered current rates" (*15*, p. 231).

When due consideration is given the relative risks involved, a 3 or 4 percent rate of return of long term is somewhat comparable to a 5 or 6 percent one of short term. In sustained-yield forestry, as in other investments covering a long period of time, the rate of profit actually earned tends to be driven down to a low level (*5*, p. 125; *16*).

Up until the present time, however, most forests of any size have been acquired at fractions of their worth. The resulting profit has been an added inducement for informed investors to undertake forestry programs. It will continue to be such an inducement until the time when the price of land and growing stock approaches the values created by good management. In the far West, on the other hand, some holdings were acquired with money borrowed at 6 percent, which when carried over a number of years, more than equaled the value of the timber (*6*, p. 281).

The profit rate of interest applies in problems of private forest management where risk is present and alternative business opportunities are to be weighed. For example:

1. A forest owner has a stand stocked at 10 M board feet per acre. He considers reducing his growing stock by 2 M board feet per acre and investing the money in a 6-percent, 10-year mortgage. The forester in charge estimates that the risk rate for the forest and mortgage are both the same, 1 percent. Thus, the risk rate plus the safe rate for forest and mortgage are both 3 percent, leaving a 3-percent profit rate for the mortgage. If the prospective extra annual return from leaving the 2 M board feet of growing stock for another 10 years is not as much as 6 percent of the value of that extra growing stock, then the mortgage is the better investment.

2. A man has capital to invest, either in forest land that will yield a series of net incomes that can be estimated, or a long-term railroad bond at 3 percent. It is believed that the risk rate is the same in either case. If, when the prospective net forest income is capitalized at 3 percent, a value greater than the price of the property is arrived at, the forest land is the better investment.

Individual Time-Preference

In discussing time-preference, Fetter (*7*, p. 240) says, "Powerful and universal impulses work in favor of present gratification; man's provision for the future occurs only when imagination, reason, habit due to long training, and a strong will to pursue a distant object hold these impulses in check."

Individual time-preference, when stated in percentage, is a general expression of the balance struck between these impluses for present gratification and this will to pursue a distant object.

"The best conservationist [more accurately, the pure conserver] would be the person whose time-preference is nil. To him the value of prospective incomes, no matter how far in the future, would be the same as present income. Such a person does not exist; there is always a conflict between the present and the future" (*6*, p. 470). Cassel discusses the length of human life as it affects interest theory (*4*, p. 254-255). Length of life is also a factor to consider in estimating individual time-preferance.

It follows that time-preference varies from person to person and year to year, depending principally upon the degree to which current personal income and assets satisfy current personal wants. The small landowner whose income has never equaled his basic current wants would have little or no resistance to selling stumpage now rather than later. Therefore, he is willing not only to accept a low stumpage price but also to destroy his growing stock in order to get this fractional part of its worth. Educational programs in forestry aimed at such owners can have but very slight hopes of success. It is only as the rate of time-preference is reduced that such forest owners can be persuaded to change their forest practices.

The individual time-preference rate becomes a factor in forest management in the case of small, low-income properties, such as certain farm woodlands that are managed as a personal or family enterprise. The owners of such properties barely have enough money for family working capital. In some cases, the owner's advanced age, combined with his desire to consume all his tangible assets before death, manifests itself in a high time-preference rate. For example:

1. A farmer with a small woodland has a time-prefrence rate of 50 percent. He is offered $200 for the cutting rights on his 40 acres, or $5 per acre. This cutting will be so severe that no additional income will be possible for 20 years or longer.

Disapproving of this offer, a forester attempts to demonstrate the attractiveness of getting annual yields from the woodland by maintaining the growing stock. The forester judges that the forty will yield $1 per acre per year indefinitely if handled as he advises. Considering a 4 percent discount rate to be fair, the forester computes the present worth of the woodland at $25 per acre. Certainly this plan has an undisputed advantage over the alternative, which is worth $9.20 if similar cuts can be made every 20 years.

The farmer, however, has a different appraisal of these alternatives. With a time-preference rate of 50 percent, the present worth to him of the forester's proposition is $2 per acre. Inasmuch as he can get $5 per acre at once, he feels that the forester's advice is worthless.

Summary

In selecting appropriate rates of interest for evaluating alternatives in forest management, one finds it helpful to distinguish four concepts covered by the term *interest*.

1. The *pure rate* is the rate on the use of capital essentially devoid of any risk of loss. In this article, it is hypothesized at 2 percent from the service charge on the national debt. Its primary broad field of use is in weighing the relative merits of public forestry programs.

2. The *risk rate* of interest is added to the pure rate as the insurance premium necessary to protect the owner from loss of income. Risks are of three main types in forestry: risks in protection, in operation, and in marketing. Sustained-yield management of large properties can reduce risk to low proportions. In the case of small properties, risk will usually be high.

3. The *profit rate* of interest is ordinarily added, along with the risk rate, to the pure rate as an inducement to accept the risk. The profit rate comes into play where there are alternative investment opportunities to compare. At the present time, because some woodlands can be acquired at fractions of their potential worth under management, forest lands can be made to earn high profits.

4. *Individual time-preference* is the premium placed by the individual upon present as compared with future goods. This concept is important to foresters who are called upon to work on the depleted woodlands of small owners. Where the small owner has a high time-preference rate, it may be impossible to interest him in good forest management as a business venture.

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Coordination of Multiple Recreation Administration on Forest Lands[1]

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IN RESPONSE to public need and consequent demand, the recreational aspects of forest land administration have developed rapidly within the past two decades. In some forest areas—or in vital parts of those areas—recreational values have assumed a dominant role in the administrative plan. Such a development might be but another indication of how forest areas have contributed to the public welfare had its growth progressed at a more leisurely pace. Under such a condition it could have been more readily assimilated, its varied problems could have been more readily coordinated with each other, and the nature of its many values could have been more properly defined and evaluated.

But its development was rapid—too rapid. Like the proverbial Topsy it "just growed." Consequently many of the problems that have been brought to public attention in recent years, in which the recreational use of a forest area is a focal point, stem not from a lack of desire for recreational activities on forest lands but from a lack of proper definition and coordination of the values and services involved.

Today the administration of recreational values on forest lands is characterized by a multiplicity of conflicting problems and ideas. This is due to the fact that here one deals not only with the basic problems of biological science, upon which good forest management is based, but with human nature as well. Both have an irritating tendency to take unexpected and unpredictable turns at unforeseen moments to thwart the best plans designed to fit a given situation or fill a specific need. As a result many aspects of the administration of recreational forest lands are often confusing due to many duplications and of a misunderstanding of function and policy. This confusion and this misunderstanding are not only characteristic of a large share of the general public, but it is often shared by experienced men who deal intimately with such areas in one way or another. Few people, for instance, are aware of the sharp differences in purpose, function, and policy between a national park and a recreational area in a national forest.

It should not be difficult to discover the reason for the rapid growth of recreational interest and the hurried, often unbalanced, attempt to keep abreast of recreational demands. As the original American wilderness was reduced and as our population became more urban in character the need for suitable outdoor recreational areas increased. This trend received the first major acceleration during the late 1900's with the development of the moderate priced automobile and the construction of modern cross country highways. The range of the average American family, previously limited by the confines of the trolley, the slow pace of the horse and buggy, or the expense of rail transportation to distant points, was greatly extended almost overnight. Facilities for outdoor recreation in our existing wild lands, particularly in well known areas, were overtaxed and in some cases eventually over-run. Areas originally not considered as of particular interest in that field were often forced to give grudging consideration to public recreational demands. As a consequence recreational facilities in many areas have not only lagged but administrative policies between areas of different type have lost their clear-cut distinctions. For this reason unnecessary conflicts have arisen between recreational uses and those concerned with other vital forest services.

The modern highway and automobile have also served to concentrate populations of recreationalists which is the basis of pressures to open up and "develop" other wild lands. By yielding excessively to such pressures without giving due thought to the long-time values involved, we often find ourselves in a position not unlike the man who killed the goose that laid the golden egg. The intangible values that render such areas attractive from a recreational point of view are often greatly modified, or even destroyed, through overuse. Intrinsic recreational values can often suffer as much from recreational overuse or "development" as from improper practices of harvesting forest crops on such areas.

It is also obvious that recreation is not a producer of direct money returns to the same extent as some other forest values—timber, grazing, and the like. True, studies have been made which clearly indicate the monetary values embodied in the "tourist dollar" but such revenues, which go into supplies and services of a greatly varied nature, are hard to pin down definitely as contributing to the welfare and support of a forest economy. Furthermore, such revenues are rarely received directly by the agency administering recreational forest lands. In consequence it is often difficult to defend recreational values on a dollar basis, an important factor when one finds it necessary to measure operations and activities with an economic yardstick.

Confusion of Meaning

Another reason for the confusion that exists in the recreational picture is the variety of interpretations of the term recreation. Each individual defines the term in the light of his own interests and activities, usually to the exclusion of other interests with which he is not primarily concerned. Often similarly interested individuals band together for pressure purposes and this spawns the development of other groups with opposing views. When this happens, and this sort

[1]Presented at the meeting of the Division of Forest Recreation, Society of American Foresters, Seattle, Wash., October 12, 1949.

of thing seems to be gaining momentum, we observe a spectacle of varied schools of conservationists working against rather than for the idea with which each is basically concerned.

Hunters vie with those who see only interest and beauty in wild animal life; skiers rail against those who seek to prevent the excessive development of lifts and similar facilities; sincere foresters, ardent supporters of sustained yield management, discount the ideas and principles for which their more esthetically minded counterparts stand, and vice versa. The error here lies in the fact that each of these groups defines the term "recreation" primarily on the basis of its personal interests and seeks to apply that definition broadly to all areas without careful analysis of all factors involved.

So recreational administration of forest lands is fraught with many problems. These problems have their basis in too rapid growth, a confusing variety of definitions of the term recreation, the fact that this field is not and probably never will be a large producer of direct revenue for the forest, and the fact that it deals so intimately with unpredictable human nature.

Because forest lands embody so many recreational outlets it is obvious that this type of activity will grow rather than diminish in importance. Consequently a sincere effort must be made to get to the bottom of its problems so that they can be solved.

This is necessary for several reasons. First, to eliminate as much of the needless confusion and controversy between conservationists of different idealogies which often works against the best interests of all concerned. Second, to enable us to maintain the many recreational values inherent in our forest lands so that future generations may also enjoy them. Third, to reconcile and where desirable integrate the recreational services with those of more utilitarian aspect. And fourth, to provide the widest possible recreational outlets for the greatest number of people at the lowest possible cost.

To accomplish this goal it is essential that we evaluate and clearly define the purpose and function of each area having recreational values, not only with other outdoor recreational areas but with other forest services on the same area; and then administer each of these areas on the basis of such definitions. In such a manner we can most readily coordinate our important recreational land units so that they supplement rather than duplicate one another. By so doing our national recreational picture, instead of resembling a hash with many expensive duplications, overlapping of function, and consequent public confusion as to the service they are best able to provide, will take the form of a mosaic with each part fitting logically and economically into a definite pattern.

Some areas, like many under National Park Service administration, embody values of great significance. They should be recognized not only as recreational areas but as recreational areas of singular type. Originally conceived as outdoor museums, they present to the public some significant feature of the geology, biology, archeology, or history of our nation in a dramatic, inspirational fashion. If adequate interpretive facilities are available these interests become understandable to the layman. In consequence they are more interesting, and visits to these areas are more enjoyable and embody maximum cumulative value. National park areas are much more than outdoor playgrounds, attractive places to hike, ski, or fish. These are desirable activities but in a national park they should be considered as a means to an end rather than an end in themselves. Recognition of this point explains why areas such as Gettysburg battlefield are alligned with Yellowstone and Grand Canyon National Parks. It further explains why national park areas need not be scenically beautiful. Of course many are, but it is the significance of the area rather than scenic beauty which serves as the criterion of its status.

It would seem that the solution of our principal northwest recreational problem, the controversial Olympic issue, could be most readily achieved if all parties concerned would consider all facets of the problem in an unbiased manner and evaluate the area on that basis. And, assuming that this intricate problem could be solved in that manner, the value of that area to this region and the nation would be measurably enhanced if adequate means were provided so that the general public could understand its significance. Too, scientific forestry would benefit from such a plan, for the outdoor museum would serve as a natural laboratory; as a means of illustrating both the good and the undesirable in nature's methods as applied to timber development from which we could gain considerable information of value.

Whenever this thought of outdoor museum administration, as applied to the national park areas, is mentioned many assume that it indicates an unsympathetic attitude toward other recreational values which, quite frankly, are of more general interest. However, this is not the case. There are many areas, indeed they are of greater extent, which do not possess the deep significance necessary for an outdoor museum. Many which embody features of significance have counterparts of greater value from that standpoint in the national parks. In such areas one can provide for broader fields of outdoor recreational activity by means of a more liberal administrative policy. Hunting in season, more elaborate skiing facilities, summer home sites, and even proper utilization of timber resources are suitable in such cases. Many national forest areas fit into this category. When this is properly done they mesh snugly into the overall recreational needs of their region and the nation, at one and the same time fulfilling the multiple use principle, aid in relieving public pressure on outdoor museum areas, and serve to enlighten the public on the basic differences in administrative policy of these two

valuable and important units in our plan of conservation of natural resources.

Reclamation areas with their potentialities for unexcelled water sports serve a similar though somewhat different multiple use function. Even private lands have recreational values, though this aspect is not likely to develop fully for some time.

State park developments are usually approached along parallel lines. Many of these areas are developed purely from the standpoint of providing physical relaxation and are located primarily with regard to the needs of large population centers. However, it is encouraging to note that many states are vitally interested in preserving and encouraging an understanding of many important areas of statewide significance, the principal points of historical, geological, or biological value. The chief danger here lies in the fact that purely physical recreational features may be allowed to develop on the significant areas to a point where the main reason for their existance becomes secondary, or where it is even lost entirely.

The nation's forest recreational picture, to which our forest areas contribute so admirably, has suffered greatly from growing pains. But forest recreation fulfills a need for our people which is going to increase rather than decrease in value. And, since it is not a large revenue producing item in forest management—its support will continue to come principally from public funds—the strictest economy of administration is necessary. Since the preservation and protection of the more fragile wilderness values depend upon proper use and intelligent understanding, it is vital that all concerned evaluate and define the most logical services of each type of unit in the national recreational plan. If the development and administration of these units, whatever the nature of their control happens to be, is carried out on a basis of concise definition of primary values we can expect the best possible outdoor recreational service for the greatest number with the greatest economy. By such means these areas will most logically fulfill their purpose and maintain their interesting character for the future, and confusion, controversy, and misunderstanding brought about by the overlapping of function and duplication of facilities, should be largely eliminated.

Abstract of Master's Thesis

The Effect of Some Physical Sterilizing Methods on the Natural Decay Resistance of Small Wood Blocks in Laboratory Tests. By John Shaw Boyce, Jr., Yale University, School of Forestry, New Haven, Conn. 1948.

The exposure of small wood blocks to pure fungus cultures in the laboratory is a useful way of supplementing field information in the evaluation of decay resistance. Various simple methods involving the use of heat may be employed to disinfect the wood. However, it is necessary to know whether such procedures may physically or chemically alter a wood's properties and in so doing affect its resistance to wood-rotting fungi.

Blocks measuring $\frac{3}{4}$ by $1\frac{3}{4}$ by $\frac{1}{2}$ inches in thickness with the grain were cut from air seasoned heartwood of Sitka spruce (*Picea sitchensis* (Bong.) Carr.), Douglas-fir (*Pseudotsuga taxifolia* (Lam.) Britt.), baldcypress (*Taxodium distichum* (L.) Rich.), and western red cedar, (*Thuja plicata* D. Don). Pure cultures of the brown rot fungi, *Poria monticola* Murr. and *Lenzites trabea* (Pers.) Fr. were grown on 3 percent malt agar in French square bottles for about two weeks, at which time the sterilized blocks were placed directly on the mycelial mats. The amount of decay was taken to be the weight loss on an oven-dry basis after fungus attack, following different periods of exposure.

Several sterilizing treatments were selected for comparison.

1. Flaming—rapid passing of the block through an open gas flame several times without charring the surface.

2. Oven-heating—heating in an oven or in an autoclave in previously heated closed gas containers for 20 minutes at 100 degrees C.

3. Boiling water dip—quick immersion in boiling water.

4. Autoclaving—steaming under pressure for 20 minutes at 15 pounds, the blocks being in closed containers.

Actual weight loss data were obtained only for Sitka spruce and Douglas-fir. There were no marked differences in the decay resistance of blocks sterilized by the described methods when they were compared with untreated control pieces. It is thought that moisture content determinations made following exposure to the fungi explain such minor variations between treatments as did occur.

The cypress, because it contained internal contaminants, permitted a ranking of the treatments' effectiveness. Oven-heating was a more thorough sterilizing method than boil dip. Flame treatment was omitted for this species. Only autoclaving would have permitted the use of this material in pure culture evaluations. Although *Poria monticola* decayed the cypress blocks it did not attack the western red cedar in six months' time. The fact that the fungus did not grow into the cedar wood regardless of the sterilizing methods employed would indicate that measurable effects did not result here either. *Lenzites trabea* did not decay the cypress and was not tried against western red cedar.

The Place of the Public Relations Division In the Work of the Society[1]

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FORTUNE magazine has defined good public relations as "good performance—publicly appreciated." More academic and longer definitions can be found, but this one concisely sums up a big job in a few words.

The objective of any good public relations program is to bring about a harmony of understanding between a group and the public which it serves and upon whose good will it is dependent.

The Society of American Foresters is in the peculiar and sometimes embarrassing position of having to sell by logic an intangible item—natural resources and their wise use—to a public which is more easily swayed by emotional approaches. It is also handicapped in having within its membership representatives of private, state, and federal agencies whose idealogies are not always in agreement with respect to methods of attaining economic conservation.

It is an axiom in public relations that every public relations program has its genesis in a problem. Either we have done something wrong or else we are not getting full credit for doing things right.

To avoid argument, let us assume that the latter condition applies to the Society. We organized the Division of Public Relations a year ago, partially because many of the actions we have taken and are taking did not receive a good enough press or sufficient public understanding. An industry as important as ours is now becoming in the national economy must be more fully understood by the public, because poor public relations is measured at the ballot box.

Division Objectives

We defined our objectives in a rather academic way:

1. To permit an interchange of ideas and methods of forestry public relations work by bringing together specialists and workers in the field for purposes of developing, exploring, and appraising methods and techniques applicable to public relations in forestry.

2. To help plan programs of public relations with a view to a greater coordination of effort among workers in forestry public relations.

3. To help avoid duplication of effort and expenditures on the part of public and private agencies engaged in public relations, and to speed attainment of sound forestry practices and constructive public support.

4. To stimulate greater effort on the part of all foresters by making known to the profession the methods and techniques best applicable to all phases of public relations problems.

If one were to evaluate the relative importance of these objectives, it seems that number four, involving an elementary education in public relations fundamentals, might well top the list. As professional foresters, we are indeed guilty many times of not seeing the forest because of the trees.

One of the jobs the Division could well undertake, if budgetary limitations permitted, would be to conduct regional training schools to acquaint Society members with the "do's" and "do nots" of getting along with the public. The forestry facts of life need to be disseminated more widely and effectively—and in simple language—in an age which will lean heavily on cellulose, harvested from a natural resource which must be managed for the public welfare, even though held in private ownership.

In the last analysis each one of us is a public relations agent, whether he likes it or not. Everything each of us does in carrying on his daily work, or in representing the profession, socially reflects on the entire forest industry. Each of us is the Society and also the company or agency for which he works.

Textbooks define public relations as including many facets of activity. Some of these relations include personal, personnel, industrial, government, supplier-creditor, community, trade, opinion surveys, advertising, publicity, and semantics. The Society as a body is probably concerned primarily with government, community, trade, opinion surveys, publicity, and semantics.

Working tools of the science of public relations include the press, radio, films, printed material, public speaking, and professional writing. In some way or other, nearly all these media can be employed successfully by the Society in carrying on an effective public relations program.

A Program Needed

To select the correct tools for the program before the Society, we must first define a program.

Such a program is a written and detailed analysis defining the Society's problems and the methods to be used in solving them. A program is best formulated on the basis of a fact finding analysis, such as an opinion survey. Many companies carrying on successful public relations programs have beamed their concerted attack on the weak points in their human relations.

To be specific, one such extended survey for a company indicated that it was well thought of by the middle class of people, particularly those in business. But the communities in which plants of the concern operated were uninformed as to the company's plans for the future, its operating policies, and many other facts upon which community welfare and good will depended. The public relations program was formulated to correct this condition.

The Society's Division of Public Relations should first of all pre-

[1]Presented at a meeting of the Division of Public Relations, Society of American Foresters, Seattle, Wash., October 12, 1949.

pare a basic program as a blueprint for action. In it would be indicated the segment of the general public to receive concentrated effort and the media to be employed in doing the job. The program would define the type of campaign to be pressed and the duration of each major type of promotional activity.

The Division's place in the work of the Society might then be briefly summarized as follows, in order of importance:

1. To disseminate the A, B, C's of good public relations techniques to the profession, preferably through a combination of a simplified textbook and regional training schools.

2. To prepare a working program for unified public relations effort based on a fact-finding survey which would seek out the weaknesses in the Society's human relations.

3. To interchange ideas on new techniques and ideas at the annual meetings and through periodic news-letters from time to time. Detailed case examples would best serve as subject matter. Several of the public relations news-letters published by private agencies will serve as examples.

4. To help avoid duplication of effort and expenditures on the part of public and private agencies engaged in public relations. It seems questionable at this time as to how much real progress could be made in instances where major differences of philosophy exist for doing the conservation job.

Possible Activities

A letter survey of Society membership indicates some of the public relations improvements we might make:

1. We should reach agreement on the demonstrable facts regarding natural resources and their wise use. These facts should then be disseminated by the profession instead of individually by governments, business and agencies which are usually accused of political motivations. The Society should be looked to as an authentic, impartial source of facts on the nation's basic national resources of forest and forested range.

2. The Society should be the clearinghouse for standards in forestry practice. We have made progress with respect to standards in certifying acceptable performance by schools of forestry and for identifying forest types. Unfortunately, this understanding prevails mostly within the Society. Regional rules of forest practice would be another step in this direction. There is not enough publicity given to the "S.A.F. Standard" affixed to significant forestry movements.

3. Membership in the Society should be featured in news items concerning foresters. This should reach down to the grass roots of such announcements as births, promotions, transfers, accidents, appointments to civic professional committees, etc. Persistent effort by all public relations men would mount up in volume on an annual basis. Let us be proud of Society membership.

4. Use of correct and simple forestry terminology should be assiduously followed. As foresters, we are still sometimes guilty of not saying what we mean in public utterances. The extreme confusion which prevails today as the result of misuse of the term "selective logging" is a classic example. Popular writers and emotional conservationists have seized upon the phrase as the cure-all for all forestry ailments. Newspapers and magazines are brimming over with articles by advocates of selective logging for Douglas-fir, when what is really meant is area selection of mature stands or partial cuttings in immature stands. Within the Society we have reached a printed agreement on semantics, in our terminology book, but somehow the public does not get the benefit of this deliberated wisdom.

5. Every instance of mishandled public relations contact should be called to the attention of the Council, through the local Section of the Society. Only in this way can we correct our techniques and learn how to make an approach correctly the next time a similar situation occurs. Constructive criticism from outside sources should be welcomed.

6. Build public relations appreciation from within the Society and the outside will take care of itself. Good public relations means being a friendly neighbor with your working associates. Our greatest sin is one of omission—not commission. In most instances it is what we have not revealed that gets us into trouble. Lack of public understanding is the direct result of no information more than it is of misinformation.

7. Place particular emphasis on the governmental phase of public relations. Inform the people who represent you in state and federal legislatures of the facts about your business. With one out of every ten persons in this country working for government and these millions in turn spending billions, we have no greater audience to reach than this group.

Government under existing authorizations can limit competition in private industry or make it effective. It can also compete with private business. Government has far-reaching land use planning powers and under proposed legislation would have still more. We can do no less than present the facts of forestry to our elected representatives.

8. Be a good public relations man in community life. Representation on social and civic committees which crystallize thinking is effective support for the forest industry. More than anything else it gives the Society member a better audience.

For Immediate Action

As specific action programs for the next one-year period the Society could undertake several projects.

1. Divide the membership of the Division of Public Relations regionally or by subject matter, and assign in turn to each group the task of making news summaries of JOURNAL OF FORESTRY articles. This would be a real test of public relations ability and would make for better public understanding.

Summaries could be furnished to trade journals, farm journals,

and feature editors, or left at press club gatherings for the use of the newsmen. Such items might also make good filler material. The Society name should be featured on each handout.

2. The Division could make a careful study of public relations techniques and policies of other professional groups or agencies, with an evaluation of gains and losses.

The New York State College of Forestry, for instance, has done an outstanding job of improving the format and appearance of its publications during the past several years. The school has also engaged in outstanding radio activities, furnishing of educational exhibits to schools, distribution of forest tree seedlings, and providing consulting services to landowners. These are all "pay-off" investments in public relations.

3. The Division should make a special effort to utilize the publicity media of public relations. Publicity, of course, is in itself not public relations; it is information with a news value designed to advance the interests of a place, person, cause, or institution. A good example of the use of this technique is in connection with the Society meeting held in Seattle; a large amount of favorable press attention was received.

Publicity media include magazine articles, books, advertising, direct-mail pieces, films (motion pictures and slides), outdoor signs, exhibits, radio, public speaking, and several others. The greatest difficulty in utilizing publicity media is that the average Society member does not recognize the news-worthiness of an event when it occurs.

In appraising publicity media let us not overlook television, which should be a favorable outlet for many of our stories. It is well adapted to dramatizing some of the colorful aspects of our industry.

The Division of Public Relations can have a full time job in Society affairs. Public support programs, such as the nation-wide Keep Green, Tree Farm, and More Trees programs, go a long way in winning public understanding of our problems. There will be room for additional work by an aggressive Society alert to the future of forestry.

Abstract of Master's Thesis

Certain problems of a group of wood-using industries in Iowa. By George L. Dorsett. Iowa State College. 1949.

The purpose of this investigation was to determine the wood utilization problems existing in a group of 78 Iowa industries using wood totally or partially in their operations. It was estimated that in 1948 these industries consumed about one-seventh of the total footage utilized by the wood-using industries of the state.

The inquiry was made by letter using a form questionnaire and information was requested concerning volumes of species used, wood quality, availability, costs, forms of use and delivery, kiln-drying facilities, distribution of products, labor supply, experience of foreman, and the employee-training programs. Statements of specific problems not covered by the questionnaire were also requested.

In volume the most important Iowa grown species used were cottonwood, maple, red oak, elm, basswood, white oak, and black walnut.

The fine species obtained in largest volumes from outside of Iowa were: (1) ponderosa pine, (2) white pine, (3) sugar pine, (4) Douglas-fir, and (5) gum.

Some of the objections to Iowa grown species were:

1. Insufficient quantity, part of which may be due to the small woodlot owner's lack of marketing facilities.

2. Expense and difficulty of processing them compared with the woods shipped into the state.

3. Too great a variation in moisture content indicating the need for dry-kiln facilities.

On the other hand some concerns reported that they found Iowa grown wood generally available and at a lower cost than material purchased from outside of the state.

The investigation pointed out the need for the use of a definite set of rules and specifications for the sawing, seasoning, and grading of Iowa grown woods and for research concerning the disposal or uses of wood wastes. A majority believed that their personnel was satisfactory as it stood, but that their foremen could be of increased caliber. Technical training of foremen was desirable and it was generally believed that employee-training programs would be of value. Scarcity of labor was not a problem for most of these concerns.

In the thesis recommendations and suggestions of possible solutions for solving or minimizing the problems indicated above are discussed.

The Northwest Way of American Forestry[1]

Arthur B. Langlie
Governor of the State of Washington, Olympia.

ANY MAN who is governor of the woodland state of Washington has to be a spokesman of forest policy and a forest land administrator. This was my responsibility through 1941 and most of the war years, when our forests were taking a giant's part in America's battles. Now I hold it again, and so, speaking for the people of a forest state, I venture to address the technicians of American forestry on our way of forestry in the northwest corner of the country.

What I have to say to you foresters is the result of observation, experience, and investigation in the forests of the Northwest. As a citizen and as a public official, a layman has had a long look at your profession in an area where the forest has been the economic powerhouse from the first, through use of virgin timber, and now contains the promise of becoming one of the very great timber-growing areas of the world.

This fast-moving transition from old forests to new rings with promise for the profession of forestry. I have seen estimates which indicate that from 60 to 70 percent of the wood now harvested and used in this country is from regrowth on cutover lands and burns.

E. T. Allen, who founded the Western Forestry and Conservation Association forty years ago, once said that investment in the reforestation and protection of logged-off or burned-over lands was investment in the cheapest form of prosperity insurance that the Northwest could buy. The Allen idea is now accepted in all regions of America where much of the productive land is more suited to trees than to any other soil crop. In Oregon and Washington it has become an economic law.

Our forest economy here is also ruled by a concept that was expressed by Theodore Roosevelt this way: "The fundamental idea of forestry is perpetuation of forests by wise use." This idea early became the guiding policy of national forest management. It is the fundamental idea of the American Tree Farms program, which was started in Washington State with the Clemons Tree Farm of Grays Harbor County in 1941.

Our Northwest history and folklore present the pioneer's view of the forest and its people as something very different from the view of today. In the 1880's a song called "The Old Settler" was written by some anonymous bard and is still heard on Washington radios. In it a pioneer tells of his travels, which led him at last to "a country they called Puget Sound." The verses continue:

Arriving flat broke in midwinter
I found it enveloped in fog,
And covered all over with timber
Thick as hair on the back of a dog.
I took up a claim in the forest
And set myself down to hard toil.
For two years I chopped and I labored—
But I never got down to the soil!

The last two lines tell a story that has been a really grim one for thousands of people who have tried and failed to make farm land of forest land in this region. Until a comparatively few years ago our densely growing timber was seen by many as more of an obstacle to progress on the land than as a resource to be perpetuated.

The Douglas-fir forests west of the Cascade Mountains in both Washington and Oregon and the ponderosa pine region on the east side recognize no state lines. This is why I am speaking of the Northwest, meaning both states, rather than simply of Washington at this time.

Our forest and forest industry history is one, our forest economy is one, we must look ahead and go forward together on an integrated forestry program, and Oregon and Washington together face the danger of being thrown back into the condition of territories by the incredibly increasing power of the federal government over the land and the lives of the people of our two Northwest corner states.

It is not my intention to make this an occasion for an attach on the master plan that would vest political and economic authority over the Columbia Valley region in persons whose outlook is on the Potomac. The danger does need to be cited here because it cannot be ignored in any discussion of the forest economy of Washington and Oregon. My purpose, however, is to highlight constructive elements of our present situation and its promise for our No. 1 natural resource and its perpetuation through wise use.

We have made progress. We are going forward. There is no dire emergency in sight that calls for federal action. The regional and local officers of federal forest agencies, state forestry officials, and forest industry managers are cooperating in forest administration and in forestry planning. Strong movements of forestry education are going ahead with expanding forces and widening fields. There are the Keep Washington Green programs of forest fire prevention, which were started in 1940 for the education of the Northwest's general public on this first thing of forestry. There is the Tree Farms program, already mentioned, which began with foresters as an idea for education in the values of growing trees on tree land. There is the More Trees for Washington project, which is carrying on education in farm forestry with fine success. There is the newly formed Committee on Conservation Education, which is going rapidly ahead to introduce more study of forestry and other conservation subjects in the public schools and to provide instruction in these subjects for school teachers. There is the great Oregon state program for replanting the Tillamook burn.

Many more items of the kind could be reeled off the record of what the people of Washington and of Oregon are doing, with the active cooperation of foresters and forest industry managers, to solve our forest problems in the tried and true way of cooperation and education. This is the Northwest way of American forestry. The

[1]An address given at the annual dinner of the Society of American Foresters, Olympic Hotel, Seattle, Wash., October 12, 1949.

only other way in sight is to yield authority to a dictatorial group and then line up and wait for orders. It has happened elsewhere. It can happen here.

Historical Development

A look back in our history and a few facts on our present forest situation will show that cooperation and education have given good results. That is all: plain and simple good results from hard work, from trial and error, with the errors admittedly many, and no mighty magic involved. There are no guideposts of grandiose promises on our way. All read, "Hard Work and Rough Going Ahead." But the way *is* free for all. We shall keep it free.

It began when America's Captain Robert Gray discovered the Columbia River and Grays Harbor, and England's Captain George Vancouver explored Puget Sound, all in 1792. The Pacific Northwest was all wilderness then, from the redwoods of Spain's California to Russia's Alaska spruce. In the wilderness the explorers found a species of tree that was new to them. It proved to be powerful timber for ship masts.

David Douglas, a young Scottish botanist, blazed trails through the wilderness south of the Columbia in 1823-1825. He sent seeds and sample of the region's great king tree to the horticulturists of England. There the tree was named for him—Douglas-fir. Douglas also discovered the sugar pine of southern Oregon and northern California.

The covered wagons of the mighty migration west began to wheel into the Oregon country in 1842. When gold-seekers rushed to California in 1849 a number of waterpowered sawmills were already making lumber along the Willamette and Columbia Rivers and one was at work on Puget Sound. In that year more than a million board feet of Douglas-fir were shipped from Oregon City to San Francisco. Piling and poles were cut along the Columbia for construction on the waterfronts of the roaring goldfields.

Such was the real start of our lumber trade. Our shipping was bred on lumber cargoes. Our railroads were built to carry wood to Midwest and California markets. Our cities were first sawmill villages. Highways began as skidroads. Timber industry taxes have been the main support of government and of education all the way through our region's history. Timber payrolls have provided local markets for farmers and brought investors in local retail businesses and other enterprises that depended on the basic industry of the Northwest, the industry of the forests.

Timber was the taproot of the giant growth of the Northwest economy and its regional civilization. And so it remains.

Value of the Forest Resource

Statistics provide the one common yardstick we have for measuring economic conditions and resources. A recent report, a digest of a number of compliations on the Oregon and Washington wood-using industries, placed the value of the products of these industries in 1948 at nearly 1.5 billion dollars. This means $375 per person for all the population of Oregon and Washington. A total of 170,000 persons, employed by the wood-using industries of the two states, received a half billion dollars in wages.

Agriculture, the second producer of income for Washington and Oregon, had a yield of about one billion dollars in 1948, including government price supports. An interesting comparison of Oregon and Washington's 1.5 billion annual income from wood is with one year's income of Illinois and Iowa together from corn, amounting to $814,000,000. I have a figure of 1.1 billion dollars for Pennsylvania's 1946 mineral production — 400 millions less than the Northwest's 1948 timber income.

The railroads of the two Northwest states carried 37,620,000 tons of revenue freight in 1948—about 58 percent of this tonnage was wood products. In the average year 80 percent of the tonnage carried on ships from Washington and Oregon ports is from trees.

Improved Utilization

Oregon has led Washington in lumber production since 1938. Washington, with exceptional stands of western hemlock, has gone far ahead of Oregon in pulp production. Other phases of advanced industrial wood use have grown in old Washington sawmill centers, both in the pines of the east side and in the west side forests of fir, hemlock, cedar, and spruce; so that more wood per acre is being harvested year by year, more man-hours of employment are provided per thousand feet of log, and more money is available for the forest practices needed to produce and protect new tree crops.

Time permits only reference points to be made on some of our major areas of forest progress. A government report of a year ago showed that forest industry employment was at about its 1926 level in Grays Harbor County, although only a third of the amount of timber cut there in 1926 was being harvested annually at the time of the report. Far from Grays Harbor, in the northeast quarter of the state, one forest industry concern is operating voluntary sustained yield program on its own lands and on those of the federal government and the state, with diversification and refinement of products in manufacture yielding in woods and mills *37 man-hours of labor for every thousand board feet of timber harvested.* This must be a North America record.

Another inspiring story of utilization plus forest management is continuing in Cowlitz County. Snohomish County has a farm forestry development that has won national attention. In King County at White River, private enterprise has been producing logs and lumber for over fifty years and is building for the half-century ahead. On Seattle's municipal Cedar River watershed a famously successful program for the conservation of water and timber combined is in operation. Mason County, Pierce, Clark, Kittitas, Lewis, Clallam, Chelan, Pacific, Klickitat — Washington county after county has its own shining record of progress in forestry that has grown and thrived

on the principle of wise use. And so the record runs all through Oregon. It is an all-Northwest record of good results.

The regional and local supervisors of the federal forestry agencies have always taken a leading place in the cooperative line of march in this Northwest way of American forestry. The same should be said for the state agencies, for the forestry schools of the University of Washington and Washington State and Oregon State colleges, for the industry associations, and for the numerous private conservation organizations. Such federal laws as the Weeks and Clarke-McNary Acts have served us well as "rules of the game" for federal participation in our forestry progress. State legislation has of course been necessary for every important advance. We have good forest laws in the Northwest. But they are good only insofar as the majority of the people believe in them, observe them, and support them.

Forestry Depends on Markets

In my observation foresters are prone to think too much about legislation and to work too hard on it, while at the same time they think too little about public relations and apparently give no thought at all to forest markets.

All along the way of Northwest forestry, however, the consumer of forest products has been the key man in the timber picture. It was the consumers in 67 foreign countries whose good money paid for the development of Northwest lumber ports and for the building of export sawmills. The money of New York and other Atlantic Coast builders kept lumber ships steaming from the Northwest through the Panama Canal after 1915. The Iowa farmer with a barn to build was the man the railroaders had in mind when they drove steel through the mountains into the Northwest timber. The Oregon lumber that streams steadily into California valley markets has the effect of pumping back a stream of money that pays wages, taxes, dividends, interest—and forestry bills. This is also the effect of Washington wood pulp when it reaches the rayon and paper markets, and of the plywood and shingles that are shipped from our ports to San Francisco and Los Angeles and other markets.

The forest industry investor, with markets in mind, was the one who set the wheels rolling in the first place. They were real risk-takers, those pioneers who came to this region and invested their good good money in timber and sawmills, railroads, and ships. A few of them struck it rich. Many more lost their shirts. Winners and losers, all the investors contributed to our growth.

The federal government was also an investor when it promoted railroad building with land grants. The government had been receiving no income from the land it gave, and after the railroads were built the government began to profit from the lands it had kept—while taxes poured in from its grants.

A major need in forestry is to make it a strong attraction for the investor. Forestry can be sold as sound business, as "prosperity insurance" to the investor in land and timber.

Forestry also needs to enlist more support from the 170,000 people who do the day's work in the woods and mills of the Northwest's forest industries. I assume a similar need exists in other regions. The people of the woods have gone through a great change since the time of the bullteam and shanty camp, the time of Paul Bunyan. Whatever the character of the old-time logger, the typical logger of the Northwest in our time is first of all a skilled mechanic of the timber. The timber-faller of today is a power-saw operator. The logging tractor driver and the man who wheels the logging trucks down from the pinnacles are peerless in their trades.

The true logger of the Northwest is well aware of forestry and its relation to his own work and to the future of his children. He knows that the low stump of the power saw reduces the leftovers of logging. He sees the new light machines for *pre*-logging and *re*-logging as instruments of forestry as well as of the day's work.

Loggers and sawmill men are often active on the county and local "Keep Green" committees. The experienced logger is always an experienced forest-fire fighter. He is a family man and it is not uncommon for him to send his kids to college.

There is no force for forestry in our region of greater potential strength than that of the 170,000 employees of the Oregon and Washington industries that use wood as a major material—unless it is the farmers who own the state's more than two million acres of farm woodlands.

Other Forest Values

In Washington we have a situation of increased deer population due mainly to the increasing impenetrability to hunters of our 8 million acres of second-growth forests, and a problem of widespread damage to tree seedlings on recent cutovers because hungry deer have been feeding on them.

Sportsmen and timbermen are working together for forestry progress through fire prevention and conservation education movements.

Our Northwest forests are the region's main tourist attraction. The tourist industry brings a hundred million dollars a year into Washington State. In the broad view this phase of forest use must be given such public consideration as we give to forest products uses.

Forest forage is a prime factor in Washington's yearly crop of 383,000 beef cattle, 385,000 market lambs, and 5½ million pounds of wool.

From such meetings as yours, with discussion and debate leading to agreements, does American forestry in the Northwest gain growth and force to move ahead. I have told you nothing new, in the essentials of the things I have cited. They are simple and homely stuff, of a character that is doubtless familiar to foresters everywhere. There is no such titanic drama in our way of forestry as there is in our way of the Grand Coulee Dam and the Bonneville developments. There is none of the breath-taking and spine-tingling mystery of Hanford about it.

Yet forestry and forest resource and industry are the biggest thing

we have in the Northwest in terms of land use, of people, of the human business of earning a living, of education, of recreation, of railroad business, of shipping, of taxes, of dollars and cents.

Giant problems remain before us in our way of forestry. There are enormous jobs to do. We face them as free men with free convictions. I am going to tell you some of my convictions.

A Forest Credo

No law in a book can create forestry or make forestry work. Forestry is an act on the land. Forestry that is practiced by men must be practicable. Forestry must be made to fit the framework of the going economic organization and political principles. Forestry must be popular if it is to be fully realized. It is unlike the science of medicine, to which the sick person willingly submits himself. Instead, even the simplest forest fire control measures may meet resistance. The farmer frequently resents the locked gate to a closed forest area. Such resentments can easily rise into rebellion. A large number of timber owners, both big and little, resent inspection of their cutovers by government men. Foresters have to deal with these resentments and the many others like them with the methods of cooperation and education. There is nothing else for it, there is no other way, outside the establishment of a police state and a police state version of "bulls of the woods." That is how some of these things seem to me.

Popular education on forestry remains a weak sister of the forestry family. Public relations remains a poor relation in the house of forestry. We have no more than begun to try out the possibilities of these elements of the way of cooperation and education in forestry progress. Let us give them a full and fair trial. Let us agree to hold together on the American way by which we have gone forward for a hundred years in the Northwest woods.

Fellowships Available to Foresters

The National Research Council announces that *National Research Fellowships in the Natural Sciences* will be continued in 1950. These fellowships, which are being offered for the thirty-first consecutive year, are supported by the Rockefeller Foundation to promote fundamental research in the natural sciences. Fellowships are available in the fields of mathematics, astronomy, physics, chemistry, geology, geophysics, paleontology, physical geography, botany, zoology, biochemistry, biophysics, agriculture, forestry, anthropology, and psychology.

These fellowships are awarded to citizens of the United States or of Canada, and generally only to persons under 35 years of age. The requirements for the doctorate must have been completed prior to assuming the fellowship, and the Fellow must have demonstrated a high order of ability in research.

Fellowships will be awarded by the Natural Sciences Fellowship Board at its meeting in March 1950. Applications to be considered at this meeting should be filed on or before January 1, 1950. Tenure of the fellowship may begin at any appropriate time after the Board meeting.

Further information concerning this fellowship program may be obtained from the Fellowship Office, National Research Council, 2101 Constitution Avenue, N.W., Washington 25, D. C.

Developments and Trends in Forest Products Research[1,2]

F. H. Kaufert
Director, School of Forestry, University of Minnesota, St. Paul.

It is simpler and infinitely less dangerous to survey and summarize what has happened or to play the part of a historian than it is to predict or play the role of a prognosticator.

As a basis for this discussion, a search was made for an adequate definition of forest products research. It was a fruitless search because every definition that has been offered appeared to the writer to be too narrow and often failed to recognize research efforts that are as important in the development of forest products and forestry as the work of the individuals offering the definitions: wood physicists, wood chemists, wood technologists, and logging engineers.

In the writers interpretation of forest products research, investigations on better alloys for woodworking saws, better pulping chemicals, more durable woodworking glues, and better wood preservatives, whether the investigations are made by chemists, mechanical engineers, wood technologists, metallurgists, or logging engineers, are just as surely forests products research as is work on wood structure or on wood waste utilization. Recognizing such a broad base of investigative effort as constituting forest products research does not make the task of summarizing developments and predicting the future easier, but it is important that we adopt the broader definition if we are to attempt to deal with developments and predict trends in this field.

Developments

Someone should write the history of forest products research. There are sufficient landmarks and epics of discovery in the past fifty and more years of forest products research to make such a history interesting reading even though written by a worker in the field. Give the job to someone like Stewart Holbrook or Paul de Kruif and we might have another *Seven Iron Men* or a *Holy Old Mackinaw* on our doorsteps.

Early Developments

As workers in an era of modern technology, we are prone to consider forest products research of rather recent origin and to discount earlier discoveries or, even more commonly, to accept utilization practices, equipment, and products as items that just happened. Too often we classify as research just those advances and happenings that have come about during the period of more adequate recording, say the past fifty years. However, in doing so we miss some of the truly epic research efforts that have actually had more effect in shaping modern wood utilization practices than most present day research effort. We should not leave unrecorded the early work of Chinese workers with mulberry bark as a source of fibre for paper, the achievements of the artisans of many nations with timbers suited to ship building, the classic experiments of Gemini on methods for evaluating the effectiveness of wood preservatives, Hartig's incriminating evidence that fungi were responsible for much wood deterioration, Keller's successful use of wood in the manufacture of paper, the development of steam-driven sawmills, the perfection of the band saw, and a host of other contributions important to the progress and well-being of the forest products industries.

Interesting and important as were these early landmarks in forest products resulting from the application of investigative efforts, they possessed a serious shortcoming. Most of them were the result of individual effort and lack of communication or adequate publication facilities often prevented their general adoption or evaluation of merit for decades following discovery. With wood abundant and cheap and competition with metals and other wood substitutes not too keen, there is little wonder that forest products research efforts were individual, spasmodic, and little publicized prior to the turn of the century.

Scarcity and competition are powerful stimulating influences and they combined to bring about the development of organized research effort on forest products beginning with the establishment of the Forest Products Laboratory in 1910. Developments from organized forest products research covered in our present literature, and with which we are primarily concerned, can be taken to have started at about that time and for sake of convenience can be broken down into (1) development of groups or agencies interested in and concerned with forest products, and (2) outstanding general achievements or contributions in the period of about forty years.

Research Agencies

Everyone who has perused the most recent issue of the *Forest Products Research Guide* published by the National Lumber Manufacturers Association must be impressed with the number of agencies, laboratories, and individuals interested in forest products and engaged to some extent at least in research on forest products.

Included in the list of agencies interested in and making at least some effort in forest products research are the following number of units grouped by agency:

Agency	Number
Colleges and universities	79
Federal and state government organizations	64
Forest products producing industries and business firms	142
Wood processors and consumers and miscellaneous material suppliers	322
Societies and private institutions	77
Trade associations	58
Foreign agencies	71
Total	813

Admittedly there is some duplication in this list that would cut down the total number of agencies. Also, many of the agencies listed are only interest groups and do not maintain laboratories or engage in

[1]Presented at the meeting of the Division of Forest Products, Society of American Foresters, Seattle, Wash., October 12, 1949.

[2]Univ. of Minn. Misc. Jour. Series No. 688.

forest products research. In addition, a large number of the agencies listed are so poorly staffed that they cannot be said to carry on effective forest products research programs. However, after allowing for all of these somewhat questionable inclusions in this excellent and valuable listing of forest products research agencies, we still have an amazingly large group of legitimate and recognized agencies supporting laboratories and engaging in some phase of research in this field.

The growth of this large group of agencies interested in the forest products industries, largely in the past forty years, is a development of real proportions. Of particular interest and of rather recent origin are the development of several strong industry sponsored laboratories, the Institute of Paper Chemistry and Timber Engineering Company, and the growth of forest products research in several forestry schools on the West Coast and in the East. Also, of real significance is the establishment of a number of forest utilization units by the U. S. Forest Service which help augment the research program of the Forest Products Laboratory and aid in putting research discoveries into practice.

Forest Products Publications

Possibly as important and significant as the growth of interested agencies sponsoring forest products research effort is the growth in number and improvement in quality of publications reporting the results of such research.

A rather incomplete list of publications, periodicals, and publishers that are devoted to forest products or which occasionally publish articles dealing with forest products research, indicates that there are more than 200 of such sources in the U. S. alone. Again, as in the case of agencies, there is the question of quality and quantity, but there is little question regarding the importance of this development in interest and its general effect on forest products research. Certainly, there appears to be no shortage of publication outlet or lack of opportunity for publication by the forest products investigator who has a contribution to make.

Research Developments

It is not the intent of this discussion to attempt to summarize the important research developments in forest products since the inception of organized research effort in this field. There is no discounting the number and importance of the contributions that have resulted from the efforts in forest products research. Yet, the question is frequently asked whether the investment in forest products research during this period has paid off or resulted in contributions equivalent to those obtained through research investments made by the manufacturers of competitive products. Because of lack of accurate information on the amount that has been spent or is being spent on forest products research and on the value of the resulting research contributions, any attempt to evaluate the worthwhileness of this research and make a comparison with other industries is admittedly pure speculation, and there is limited value in such indulgence.

However, if we accept a figure of around $10,000,000 as possibly being about the maximum that is being spent today on forest products research by all agencies, and, if we accept the assumption that the contributions that have been and are being made are as valuable to the forest products industries as similar research investments are to the manufacturers of competitive products, then we have a basis, somewhat questionable to be sure, but still a basis, for comparison. This basis consists of comparing research investment with total value of products manufactured.

Such a comparison indicates very definitely what has been asserted time and again by leaders in forest products research, that the investment in research by the forest products industries and all other agencies interested in forest products is far less in proportion to the value of products manufactured than is made by practically any other industry, competitive and otherwise. Thus the investment in forest products research is considerably less than 1.0 percent of the total value of forest products, whereas the steel, chemical, and light metal industries are reported to invest up to 3 percent of the value of their products in research. There are, of course, notable exceptions to this generalization among the forest products industries. The pulp and paper industry no doubt makes a research investment equivalent to those of the steel and chemical industries, but this is counterbalanced by the very small investment by the lumber and most secondary wood-products industries.

Important, too, is a consideration of the efficiency and effectiveness of research in forest products conducted by the numerous and small scattered laboratories in comparison with the smaller number of large, well-staffed and well-financed laboratories supported by other industries. This type of comparison of the effectiveness of research effort leads to the same conclusions one arrives at when comparing other factors, that one of our primary difficulties is that we have too many small and inefficient units for maximum contribution and effectiveness. However, this is an unavoidable condition that we are obliged to accept, but should attempt by all possible means to bring to maximum efficiency through better training of workers, greater exchange of ideas, and all possible avoidance of duplication in research effort.

To summarize this discussion of developments, it can be said that this period of organized forest products research has witnessed a phenomenal growth in number of interested research agencies, better communication between research workers through a large increase in avenues of publication, and development of a few laboratories of sufficient size to undertake reasonably broad and productive research programs. But in comparison to other industries, the situation is one of inadequate research investment and an overabundance of small, inefficient, and poorly financed research laboratories.

Trends

This is where history ends and prognostication begins. However, there are certain indications that do indicate trends in forest products research. How soon or whether some of the movements that are

evident will be consummated must remain to be answered at some future meeting of this group.

There can be no quarrel with the statement that there is a rapidly growing interest in forest products research. The organization of the Division of Forest Products of the Society of American Foresters and of the rapidly growing Forest Products Research Society are certainly proof of this increased interest. And this increase in interest is not limited to workers in the field, but extends and includes the development of a decidedly greater public interest. Some of this interest has no doubt resulted from overly glamorous and unrealistic reports of forest products developments published in newspapers and magazines, and many of these reports have possibly done considerable harm to a better understanding of the problems facing forest products research workers. But there is little doubt that the result has been a greater public awareness of forest products problems and developments.

Paralleling this increase in interest is the increase in number of young men being attracted to this field. Practically every forestry school and many engineering schools are training more men in forest products, wood utilization, wood technology, wood chemistry, and products merchandising than ever before. This trend will no doubt continue and should eventually result in greater competency and productiveness of research workers. This conviction that progress is being made on the problem of more adequate training should not be taken to indicate that there is satisfaction with the present situation. Our schools still are not staffed with a sufficient number of well-trained, stimulating, and experienced teachers to engender too much enthusiasm for the possibility of reaching this goal at an early date. There is still too much rivalry and competition for priority and claims to areas of training between various groups within institutions. The need for cooperation between engineering and forestry schools in the matter of training for the forest products industries as well as for forest products research is greater today than ever before. It is an unfortunate circumstance that engineers and chemists are not being exposed to a greater extent to the literature and accumulated knowledge of wood technology and do not have a greater awareness on graduation of the valuable properties, shortcomings, variability, and versatility of wood. And it is equally unfortunate that more young wood technologists cannot be exposed to a greater extent to a knowledge of engineering methods and techniques.

Although there are exceptions, particularly with respect to developments in Washington and Oregon, the trends in financing of forest products research do not appear in as favorable a light as the increases in interest and training. There has no doubt been a considerable increase in expenditure for forest products research and there is evidence that this will continue. But, as has been indicated previously, inadequate financing is still the rule and the greatest single factor in preventing expansion of forest products research to an extent considered necessary and desirable by other industries in maintaining the competitive position of their products.

Much has been written on the need for greater correlation of forest products research efforts, and a joint committee of interested groups is now studying the problem and preparing recommendations. Numerous suggestions have been made with respect to a division of the field, particularly with respect to fundamental and applied research, between publicly and industry supported laboratories.

It is the writer's conviction that, important as such correlating effort by groups and committees may be, we cannot hope to obtain correlation by legislation or recommendation, and that we must rely on the slower but certain process of education and dissemination of information to achieve this goal. Certainly reputable research workers rarely intentionally duplicate the work of others and where actual and unnecessary duplication occurs it usually is the result of lack of information and occasionally lack of imagination. Also, it is important to emphasize that some duplication of research often is desirable. With better dissemination of information through publication and discussions such as this, meetings of organizations such as those of the Forest Products Research Society, and numerous other groups, and through the training of more qualified young men with broad viewpoints and imagination, correlation of forest products research effort no doubt will take place even though not abetted by rules and legislation.

There certainly are other trends in forest products research that have not been covered and which may be apparent to everyone but the writer. However, those summarized here, greater interest, improving but still inadequate training, generally improved but insufficient financing for maximum effectiveness, and a slow trend towards correlation, appear to the writer to be of greatest significance.

Shoals and Reefs in Ponderosa Pine Silviculture[1]

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THE EARLY mariners along the coasts of our country had to sail uncharted seas. Figuratively speaking, our pioneer foresters also had to sail seas largely uncharted. Almost overnight they had to prescribe silvicultural and protection policies for wild forests that had been moulded by nature's forces for countless centuries, or for forests or forest land badly abused by our civilization.

In the ponderosa pine region, though forestry is still in the pioneering stage, enough time has elapsed to enable development of considerable navigational skill in steering the ship of forest management. Some of the shoals and reefs have been accurately charted. It is well known, for instance, that large areas have been so severely clear-cut or burned that it will take a long time to return them to productive condition. The techniques of reestablishing them have received considerable attention and reclamation is proceeding, though slowly and expensively.

Principal attention has been directed to harvesting of mature and overmature stands of our virgin forests, to leaving adequate reserve stands, to protection of advance reproduction, and to encouragement of subsequent reproduction following logging. Much thought and research have been devoted to the reserve stands, to the desirable type, age, and vigor classes of trees to leave, and to growth anticipated. Policies to be followed in selecting trees to cut or to leave have been debated; whether to be guided principally by economic or by more purely silvicultural considerations. Forest insects and diseases, together with susceptibility thereto of various age and vigor classes of trees, have been intensively studied. All these problems have commanded considerable attention, as indicated, and doubtless will continue to, for much remains to be learned. They deal with some of the most urgent matters needing attention and will have influence principally on the harvest anticipated during the second cutting cycle.

What can be said concerning harvests anticipated during subsequent cutting cycles? Such harvests obviously must come largely from present sapling and pole stands. Despite many hopeful aspects of the picture, this writer believes that the problems involved in protecting and developing these stands to harvesting time are far from simple. Indeed in the conditions and developments peculiar to these stands he sees some extremely dangerous shoals and reefs. In previous publications the writer has already discussed these in considerable detail (*5, 7, 9*.) He believes, however, that it is appropriate that they be again emphasized.

Unchartered Shoals and Reefs

It appears that though there is knowledge of some of these shoals and reefs, only a bare start has been made in charting them. By some foresters their very presence is denied. Just what do the obstacles consist of, how do they threaten success of ponderosa pine silviculture and what, if anything, can be done about it? A start towards answering such questions can best be made by taking a close look at the reproduction sapling and pole stands now on the ground.

Over vast areas of the ponderosa pine region there have developed exceedingly dense sapling and pole stands of ponderosa pine reproduction. On superior sites excellent growth is occurring. On even more extensive areas, however, very poor growth is occurring because the stands are too dense and root competition between the trees is too intense. Meyer found on eastern Oregon and eastern Washington, for instance, that but a small fraction of the growth that should be eluded that if such stagnation is allowed to persist the cuts at the end of the second and subsequent cutting cycles will be imperilled (*4*). The writer, also, has described anticipated was actually occurring in reproduction stands and con a study of growth conditions in a stagnating stand near Nespelem, Wash. (*7*).

It appears that the abnormally dense stands have developed partly because of our success, over large areas, in preventing recurrence of the periodic fires that used to sweep the ponderosa pine forests at frequent intervals. Overgrazing in the earlier days has also been of great significance in development of such stands, through breaking up of original sod cover and preparation of mineral seedbeds. Such appears to be of particular significance in the Southwestern forests.

Over other vast areas associate species such as Douglas-fir, white fir, and incense-cedar are capturing the ground under the overstory of ponderosa pine. With the harvesting of the overstory ponderosa pine will cease to exist as a type on such areas. Such development is entirely due to cessation of the periodic fires, for small trees of the presently invading species are very susceptible to killing by even light fires.

On large areas the overstory pines are apparently suffering severe competition from the dense sapling and pole stand of the understory and growth rate has declined (*1*), even where precipitation and soil moisture conditions have recently improved. Such trees are easy prey to pine beetle attack and succumb easily to debilitating effects of disease. The writer believes this to be the principal reason why in certain areas the pine beetles are continuing epidemic attacks and why many of the reserve stands that should be making excellent growth are going to pieces.

As the dense reproduction stands develop, grass and other forage plants are crowded clear out of the picture. They simply cannot exist

[1] Presented at a meeting of the Division of Silviculture, Society of American Foresters, Seattle, Wash., October 12, 1949. This article represents the author's views only and is not to be regarded as an official expression of the attitude of the Indian Service on the subject discussed.

in deep mats of needles under dense coniferous stands. Such has been of great significance in lessening carrying capacity of forests for domestic and game animals.

Since attempted total fire suppression has been initiated and the dense reproduction stands have developed, the fire hazard has increased tremendously. The dense reproduction stands themselves are highly inflammable. The heavy needle mat that has accumulated, snag and windfall remains of numerous bettle- or lightning-killed trees, and other accumulated debris add to the fuel. Where fires normally used to burn lightly over the ground through the light accumulation of fuel, they now are more apt to rage through the tree tops, killing everything. On extensive areas the already excessive fuel has been added to greatly by undisposed of logging slash.

Where Do We Sail?

Where and how must the ship of forest management be sailed to avoid such shoals and reefs? Obviously most of these obstacles can be avoided or even removed if we are willing to spend enough money for really intensive practices. The dense reproduction stands can be thinned by the axe or by other mechanical means, and greater expenditures can be made for hazard reduction and for intensified protection. Such thinning can possibly be conducted with profit on more highly productive forest lands. Over the greatest portion of the ponderosa pine region, however, it is generally the consensus among foresters that growth is so slow and productivity so low, even under most favorable conditions, that such intensive practice is uneconomic.

Technological improvements in forest utilization practices may in time considerably alter the picture, and perhaps someday thinning of even small trees can be conducted on an economic basis. Perhaps, also, logging slashings may be utilized for byproducts. It is quite possible that these wonderful things will come to pass, but the writer wonders if such intensive practice can be made to pay on any but the most productive forest lands.

In the meantime, what should be done? Should we wait for another great depression and another C.C.C., and plan then on extensive thinning projects, or should we simply wait for the dominants to struggle above the mass of competing trees and attain gradual ascendency? The previously mentioned study of growth conditions in a stagnated stand near Nespelem, Wash., disclosed that it took 42 years for one of the largest dominants to grow to a diameter of approximately 5 inches d.o.b. at one foot above the ground. In contrast, in part of the same stand accidently thinned by fire in earlier days, under similar site conditions, the average tree of the same age class was 7.4 inches d.o.b., while dominants were considerably larger. The largest found was approximately 16 inches d.o.b. and 55 feet in total height. How long can we afford to wait for such growth?

Should such associate species as Douglas-fir, white fir, and incense-cedar be permitted to capture the ground to the almost total exclusion of ponderosa pine? LeBarron has pointed out that on such sites ponderosa pine makes its most rapid growth (*3*).

As silviculturists, should we insist on dense stands throughout the entire forest, or should we leave room for some grass and browse to grow and permit grazing of wild and domestic animals under proper supervision?

Shall we attempt to reduce the hazard in the dense stands, or shall we ask for larger and ever larger protection budgets? In this era of staggering taxes and demands by taxpayers for governmental economy it is just possible that forestry budgets may be cut, instead of increased.

Conclusions

This writer believes that the shoals and reefs discussed herein are of such nature that they may someday severely damage or wreck the ship of forest management. He also believes, as previously indicated, that, though there is awareness of the obstacles, only a start has been made in charting them and in exploring corrective measures. Highly intensive silvicultural practices may provide the desired correction, but it appears that they are too expensive for application over the greatest portion of the ponderosa pine region because of slow growth and low productivity under even the most ideal conditions. Corrective measures, therefore, must be of such nature that they can be cheaply but effectively applied over wide areas.

In an effort to develop such method the writer has attempted tests of applicability of prescribed burning on the Colville Indian Reservation of north-central Washington (*6, 8, 9*). Preliminary results appear very promising. Results have also been observed and commented on by LeBarron, who has indicated that similar tests are now being conducted in ponderosa pine stands on the Kootenai National Forest in Montana (*2, 3*).

It is the writer's sincere hope that increasing effort will be devoted towards solution of the problems herein discussed. In any event he believes it appropriate to raise the questions involved in this symposium on fundamentals of ponderosa pine silviculture.

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Airplane Scouting for Pole Blight of Western White Pine

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WESTERN WHITE pine (*Pinus monticola* Dougl.), the most valuable tree species in the Northern Rocky Mountain region, is being attacked by a serious killing disease of unknown cause. Only pole-size trees are known to be affected, and many of the finest pole stands are now breaking up. The disease, called pole blight, was first reported about twenty years ago by Roger Billings, then forester on the Kootenai National Forest, and is now known in British Columbia and in northern Idaho and adjacent Montana and Washington.

Research on the cause and control of this disease is being conducted jointly by the School of Forestry of the University of Idaho, and the U. S. Department of Agriculture through the Northern Rocky Mountain Forest and Range Experiment Station, the Division of Forest Insects of the Bureau of Entomology and Plant Quarantine, and the Division of Forest Pathology of the Bureau of Plant Industry, Soils, and Agricultural Engineering.

In the summer of 1949 the Division of Forest Pathology initiated a survey to determine the extent of the disease. The extremely rough terrain of the Northern Rocky Mountain region and inaccessibility of many areas made scouting from automobiles unusually difficult. Fortunately western white pine is readily distinguished from its associated tree species at considerable distances because of the bluish tinge of its foliage and its characteristic whorling of branches. Some of the external symptoms of the disease, yellowing and sparseness of foliage and shortening of terminals, are also recognizable at long range (Fig. 1).

For these reasons it was thought that scouting for the disease from airplanes might be feasible. Dr. Lake S. Gill in charge of the pole-blight research investigations for the Division of Forest Pathology, made the initial flight over a diseased stand of white pine on August 11, 1949, and encountered no difficulty in recognizing pole stands of western white pine or in distinguishing between healthy ones and those affected with pole blight.

Subsequent flights were made over parts of the St. Joe and the Clearwater National Forests by Ernest Wright, George Englerth, Craig Bryan, and Marvin E. Fowler, all members of the Division of Forest Pathology, to gain information on the southern extent of the disease. Both Piper and Stinson planes under Forest Service contract were used in these flights. Drainages containing pole stands of white pine were inspected on the contour by first flying along the ridges about 500 to 1000 feet above the trees and then dropping down the slopes about 500 feet for each successive tour. All the flights were made in the early morning hours while the air was calm and before heat thermals created bumpy air conditions and hazardous flying over rugged wilderness areas. Field glasses were used effectively for closer inspection of suspected pole-blighted stands. These areas were then carefully located on a large-scale map.

Fig. 1.—Pole blight of western white pine. Showing affected trees with thinning crowns in a stand 55 years old. Tall tree in center foreground developing advanced symptoms of the disease. Eastern Washington, July 1949.

In all cases it was necessary to examine the stands on the ground to determine if the symptoms seen from the air were caused by pole blight or some other condition such as logging injury, sun scald, or unusual retention of old yellowed needles. It was not difficult to distinguish from the air between pole-blighted stands and those attacked by white pine blister rust, also prevalent in the area.

Airplane scouting for pole blight enabled a few men to inspect a large area of inaccessible forest stands in a few weeks that otherwise would have taken months to reach on the ground. Areas that did not contain pole-size white pine were eliminated from further inspection, and only those white pine stands showing symptoms of pole blight had to be visited on the ground. To supplement airplane scouting, large areas were also inspected with field glasses from various lookout towers. Airplane scouting proved to be very satisfactory as well as time saving and economical.

At the outset of the survey, pole blight was known to occur in parts of the forested area from British Columbia to southern Benewah and Shoshone counties, Idaho. To check on the effectiveness of airplane scouting, information on the previously known pole-blighted areas in these counties was not referred to in making the 1949 survey. However, when the results of the survey were checked with former data, all previously known locations near the southern limits of the disease were confirmed and several new locations had been added. Another summer season's work will be necessary to be certain just how far south the disease extends into commercial stands of western white pine.

Aptitude Testing in Forestry

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AFTER MORE than ten years of searching for a forestry aptitude test, Oregon State College has abandoned the effort (with some embarrassment). It was realized, finally, that forestry had become too diversified to be mastered by a student who possessed only a forestry aptitude. Today, career opportunities and requirements are extremely varied, and wide adaptability is essential. It seems important to provide foresters with as general an education as possible rather than a narrow training.

The logical corollary is to use tests of general aptitude (and interest) in an attempt to predict success in forestry. These should be more useful than one test which is restricted to an assumed concept of unique forestry aptitude. This conclusion is reached reluctantly. It would be so much simpler if a single forestry test would infallibly separate the men from the boys. It remains to be seen if measurements of general ability predict success in forestry.

Some limited samples from Oregon State College are cited in the following tables. Data are from annual records of entering students in 1946, 1947, and 1948. The elapsed time is yet too short, and the numbers are too small to indicate anything more than trends, but it is hoped that the record will become more definitive through succeeding years.

Analysis of these test results shows what we all knew all the time, that the better student stays in school and the poorer one flunks out. However, by testing, the significant questions of who is likely to be better, and who is likely to be poorer, can be defined reasonably well. No one test is a perfect prognosticator, but the use of all these will help to identify the student's abilities and give a pretty conclusive rating of the man. For example, at Oregon State College no student in the lowest deciles of ACE, Math, and English tests had lasted through to graduation in forestry.

Thus it can be said that measurements of general ability will provide reasonable prognoses that certain students will or will not succeed in the academic phases of forestry. This knowledge give no cause for cheers. There remains the greater problem of testing for success in professional forestry. Careers in forestry are greatly influenced by personal qualities as well as by scholastic attainments, and while there is large agreement between academic achievement and professional competence, the former does not guarantee the latter.

In an attempt to discover why some students are apt and some are not, Oregon State College made a survey of seasonal and permanently employed foresters on the job, in the summer of 1949. (The inquiry was not confined to Oregon State men.) Two staff members covered the states west of the Rockies, interviewing private as well as public forestry personnel managers. The accomplishments and deficiencies of forestry graduates in general were reviewed. For the most part, forestry graduates are doing a good job, and in no instance was there observed any vital flaw in technical preparation. The chief difficulties seemed to arise from a lack of personal orientation toward a professional career.

TABLE 1.—AMERICAN COUNCIL ON EDUCATION COLLEGE PLACEMENT EXAMINATION (ACE TEST)

	Percent of students in each decile										
	1	2	3	4	5	6	7	8	9	10	Number of cases
Entering students 1946-1948											
Students graduated or still in school	0.4[1]	3	4	7	10	7	12	17	16	24	258
Students suspended	16	15	13	12	9	13	6	6	8	3	68

[1]For the past 18 years no decile 1 student has graduated in forestry.

It was found, as would be expected, that some factors inhibiting professional success are educational, and can be predicted by educational tests. However, some of the more potent reasons are not academic in nature and are not predictable through testing. For example, tests will not reveal which students are most likely to encounter personal difficulties; but these difficulties are discernible in the conduct of their field work, and the best test is to examine that field work. To be sure, this is hindsight, but it is better than no sight at all. Constant checking in the field, matched by aggressive action in the school, will remedy personal and professional deficiencies; and the mistakes of last year's graduates may be avoided in this year's seniors. Such actual field testing is necessary to complement academic testing if we are to measure the whole man.

Common Deficiencies

The more common deficiencies found in the Oregon State 1949 survey are listed below. Following each is the method proposed to overcome it.

1. *Students do not analyze problems adequately.* We should make more use of problem-solving methods in teaching; put less reliance on the lecture method and more on the student digging it out himself; place greater emphasis on fundamentals, and less on narrow techniques.

2. *Students are ineffectual in the use of written and spoken English.* Remedial reading and vocabulary building courses should be extended to a larger group of entering students. Comprehensive tests in English should be required of freshmen and sophomores; and students not attaining an acceptable level of competence should be required to remedy their deficiencies.

3. *Students are too demanding.* In some cases, students watch the 8-hour day and 40-hour week too

closely. They expect all kinds of advantages to accrue to themselves, but in some cases are unwilling to render any uncompensated service to the employer. Schools should stress the concept of service, of duty, of professional responsibility in resource use.

4. *Students expect too much in the way of social advantages.* Some beginning foresters apparently are not aware that forests do not grow in cities. They do not orient their families to a life in the woods, do not explain the lack of social amenities in the early years of many forestry careers. This misunderstanding often leads to domestic difficulties and sooner or later to professional trouble. In the school orientation course and in regular personnel conferences, the facts of life concerning starting jobs should be made abundantly clear, and young foresters should be urged to explain all the job factors to their wives.

5. *Students are not competent in work-planning; cannot organize a job.* This is an argument for a seasonal work requirement. Students should have some work experience above the laborer grade, and we should try to obtain the best possible kind of summer job in order to develop the men in elementary supervision. Seasonal employers should be asked to train students as fast as feasible, with due regard to production demands and the abilities of the men.

6. *Students fail to relate their specific jobs to the whole work program of the employer.* Too often the student thinks he is the most important man in the organization; he lacks vision, is unable to see beyond his own little job. There are two remedies: first, a more liberal education to broaden the horizons of the men; there is no reason why forestry courses cannot be liberal in nature. Second, in its entire program, the school should encourage students to appreciate the necessity of cooperation on the job.

7. *Students are not safety-minded.* In all classes, particularly in engineering and other field work, we must insist on safety first. Every field trip can be made an opportunity to stress safety principles. Good woodmanship and competent use and care of tools are indispensable elements of a safety program. In this respect, the school should insist on high standards of performance from staff and student.

None of these deficiencies is malicious, and none is incurable. Their removal will help good men to become better men. On the basis of the above findings, Oregon State College will continue to test academic proficiency by general aptitude examinations on the campus, and professional proficiency by analysis of technical aptitude in in the field.

TABLE 2.—OREGON STATE COLLEGE ENGLISH PLACEMENT TEST

	Percent of students in each decile										Number
	1	2	3	4	5	6	7	8	9	10	of cases
Entering students 1946-1948											
Students graduated or still in school	5	6	9	9	9	9	16	9	13	14	138
Students suspended	30	9	18	13	13	7	2	5	2	2	56

TABLE 3.—OREGON STATE COLLEGE MATHEMATICS TEST

	Percent of students in each decile										Number
	1	2	3	4	5	6	7	8	9	10	of cases
Entering students 1946-1948											
Students graduated or still in school	0.8	16	19	22	17	7	7	8	3	0	123
Students suspended	40	35	13	8	2	2	0	0	0	0	48

TABLE 4.—STRONG'S VOCATIONAL INTEREST TEST[1]

	Percent of students in raw score brackets																			
	0–10	10–20	20–30	30–40	40–50	50–60	60–70	70–80	80–90	90–100	100–110	110–120	120–130	130–140	140–150	150–160	160–170	170–180	180–190	190–200	No. cases
Entering students 1946-1948																					
Students graduated or still in school	0.7	0.3	2	0.7	1	5	7	9	8	8	10	12	11	12	6	5	1	0.7	0.3	0.3	262
Students suspended	4	2	5	5	0	9	4	7	16	11	9	4	9	9	5	2	0	0	0	0	56

[1]It is wholly preposterous to "average" the interests of men, but in passing it is worth noting that raw scores of students suspended averaged 87; of those retained, 116.

Wildlife-Forest Relationships in the Pacific Northwest Region[1]

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MOST WILDLIFE is as dependent upon forested areas for food and shelter as the human population is on fertile soil. However, in many cases the animals are no smarter than we humans, in that they destroy the very thing upon which they are dependent. The purpose of this paper is to point out some of the conflicts between wildlife and forests, and if possible suggest a remedy.

The Pacific Northwest forest region discussed in this paper embraces the forested areas of Oregon and Washington. About 43 percent of these two states, or 42.6 million acres, is forested, much of which will always furnish some habitat for wildlife.

The Cascade Mountain range running north and south divides the region into two zones, each having distinct climate, fauna, and flora. This condition provides habitat for a large number of different animals that make up the wildlife group. The zones are usually referred to as the east side and the west side, meaning of course their respective sides of the mountains.

East Side

On the east side we find the principal forest trees to be ponderosa pine (*Pinus ponderosa*), Douglas-fir (*Pseudotsuga taxifolia*), white fir (*Abies sp.*), Engelmann spruce (*Picea engelmanni*), western larch (*Larix occidentalis*), lodgepole pine (*Pinus contorta* var. *latifolia*), and Sierra juniper (*Juniperus occidentalis*). The latter is found principally in eastern Oregon. There are other species of lesser importance.

Nearly all these trees grow in open or semiopen stands and are interspersed with openings at rather frequent intervals, thus making it possible for the sun to reach the ground. As a result there are some forage plants found in nearly all the forested areas on the east side, but the density varies with the openness of the timber stand.

Along the lower fringes of the timber cover and occasionally extending out into the drier lands is a belt of browse species which occur in varying density and which make up the principal winter food for deer and elk. There are some thirty or forty browse species found throughout this so-called belt, but the principal game forage plants are bitterbrush (*Purshia tridentata*), snowbrush ceanothus (*Ceanothus velutinus*), curlleaf mountainmahogany (*Cercocarpus ledifolius*), huckleberry (*Vaccinium sp.*), Pacific serviceberry (*Amelanchier florida*), Douglas maple (*Acer glabrum* var. *douglasii*), western chokecherry (*Prunus demissa*), bittercherry (*Prunus emarginata*), willow (*Salix sp.*), and big sage (*Artemisia tridentata*). There are others of less importance too numerous to mention. The lower timber line is usually the line between great and lesser snowfall and it indicates the upper boundary of big game winter range during normal and severe winters. Thus the browse belt is a very important part of the game ranges.

West Side

On the west side the tree cover varies from open stands of sugar pine (*Pinus lambertiana*) and tanoak (*Lithocarpus densiflorus*) in southern Oregon, to the dense rain forests of Douglas-fir, western redcedar (*Thuja plicata*), Sitka spruce (*Picea sitchensis*), western hemlock (*Tsuga heterophylla*), and the true firs (*Abies sp.*) on the Olympic Peninsula. Due to the climate and rainfall these northern forests grow densely, and large areas are practically devoid of ground forage.

Originally the west-side forest did not support many deer or elk, but as the big timber was cut off and the land opened up to sunlight, forage plants were encouraged and animal populations increased. Areas that are clear cut and burned produce a maximum of game forage in three to five years, and deer and elk take advantage of the abundant and nutritious growth. Burned areas offer about the same conditions, and large fires have contributed much toward increasing big game on the west side. Small clearcut areas of 15 to 100 acres are the most popular with deer and elk as they can obtain food within easy reach of the big timber which is their cover. That circumstance causes game concentrations of varying degrees on the cutover areas. These openings provide good game forage from 12 to 20 years, depending on the time of reseeding and the site. After that the canopy again closes in and the land ceases to produce forage but serves only as cover.

Even without snow, and with green browse the year around, in some winters there is a heavy loss of game due to malnutrition. With 60 to 90 days of foggy or cloudy weather the principal browse plants lose protein until they will not sustain life in the foraging animals. Some die outright of starvation, but usually predators or disease pick off the weak ones before starvation finally takes them.

The population of both deer and elk on west-side forests is no doubt greater than it ever was before timber cutting began. However, some early cutover areas have passed the good forage production period, and the populations are declining. In the future it is quite evident that the good big-game range in the heavy forest type on the west side will be in direct proportion to the area of lands cut over in the immediate past twenty years.

The principal browse species of the west side are vine maple (*Acer circinatum*), huckleberry (*Vaccinium sp.*), salmonberry (*Rubus spectabilis*), western thimbleberry (*Rubus parviflorus*), bearberry (Kinnikinnick) (*Arctostaphylos uva-ursi*), blueblossom ceanothus (*Ceanothus thursiflorus*), snowbrush ceanothus (*Ceanothus velutinus*), willow (*Salix sp.*), and salal

[1]Presented at a meeting of the Division of Forest Wildlife Management, Society of American Foresters, Seattle, Wash., October 12, 1949.

(*Gaultheria shallon*). There are many others used but of lesser importance.

Fauna

The fauna is quite different between east and west side ranges, although the more important animals are closely related. Chiefly they have taken on different characteristics due to the environmental influences.

On the west side there are the Roosevelt elk (*Cervus canadensis roosevelti*), only slightly different in color and size from the Rocky Mountain elk (*Cervus canadensis nelsoni*) found east of the mountains. Few people can tell one from the other if seen alone and away from their natural habitat. The blacktailed deer (*Odocoileus hemionus columbianus*) of the west side is a first cousin if not half brother to the Rocky Mountain mule deer (*Odocoileus hemionus hemionus*) found on the east side Their principal difference is in tail conformation and the size of the metatarsal gland. Both types of elk and both types of deer crossbreed readily where the ranges are adjoining.

The black bear (*Ersus americanus*), found in both zones, has a brown color phase which occurs about as frequently as the black. East of the mountains they go in for the winter sleep. On the west side, especially near the coast, they frequently do not "hole-up" in winter, but remain active most of the year. The bear is not a hibernator in the true sense of the word. He goes into any convenient place where he is protected from winter storms and sleeps until spring. But disturb these somnolent creatures at any time during the winter period and you will be amazed if not startled at the speed with which they arouse to full activity.

The lesser animals have slight characteristics peculiar to the zone in which they live, but they are not important to the text of this paper.

Deer and Elk

On the east-side forests there is a definite movement of big game from the winter range to the high cool parks and coverts of the mountains in spring and back to the winter range in the fall. By area the winter range is the factor that controls the size of the game herds the range will support. Since 80 percent of the winter range is privately owned and generally overused by livestock, there is little chance of the herds developing beyond the capacity of the summer range. But many winter ranges are overstocked, and many of the important browse species are declining both in the quality and quantity of production and in density. This condition is serious to the continued maintenance of the game herds.

On the west side, seasonal migrations of big game are short or nonexistent. Otherwise the use is about the same as on the east side. Deer and elk populations build up to large numbers without much evidence of use except on the forage, and since they concentrate on cutover areas there are places where the conifer reproduction suffers from such use.

West of the Cascades on the St. Paul and Tacoma Lumber Company cutover land in the Puyallup River drainage, deer have eaten 80 percent to 90 percent of the Douglas-fir leaders under 4 feet in height. They have browsed the western redcedar until it looks like an ornamental shrub, but they leave the western hemlock. The forester manages these lands to encourage Douglas-fir, but the deer use has the effect of retarding the Douglas-fir and western redcedar thus letting the western hemlock get a start and dominate the site. A similar condition exists on the Snoqualmie Lumber Company lands north of North Bend, and in many places on the Olympic Peninsula.

The Weyerhaeuser Timber Company had to quite planting Port Orford white-cedar (*Chamaecyparis lawsoniana*), a very desirable tree, because the deer would pick it from a plantation in a short time. The Crown Willamette Company had a similar experience with black cottonwood (*Populus trichocarpa*).

Several plantations of fir and cedar have been seriously damaged by deer and elk pulling up the trees before the roots become established. Such damage is not entirely peculiar to the west side, although it occurs there most often. On the Bald Mountain range on the Fremont National Forest in southeastern Oregon, deer practically cleared an area planted with ponderosa pine seedlings.

Elk are harder on a range than deer. They frequently graze in large bands, and following the snow line back in the spring severely trample the soft areas and prematurely overuse the best forage species of grass and grasslike plants. Elk are heavy browsers and are killing out important browse plants on the summer range as well as on the winter ranges. When the browse is gone, elk will paw snow for dry grass and live where deer will starve. They will eat any browse a deer will eat but they take larger stems, browse higher, and break down whole shrubs such as mountainmahogany and willows, thus eliminating them from food production. Thus elk are strongly competitive with deer, and on a forage intake requirement basis one elk will replace four deer.

Elk by their gregarious tendencies have caused considerable damage to plantations on the west side near Astoria, Oregon. They band together on open ground to fight flies or just rest. Large numbers of planted trees have been killed this way. The "stamping grounds" are changed frequently, but the damage will continue until the planted trees are 10 to 15 years old.

Elk have completely de-browsed some creek bottoms on the Olympic Peninsula. The Quinault River is a good example. In the Blue Mountains of Washington and Oregon elk are principally responsible for the extermination of good browse species on both summer and winter range. During heavy winter concentrations in these areas both pine and fir seedlings and saplings have been seriously damaged or killed.

Where game habitat is limited and hunting intensity high, it is extravagance for a state to try to produce elk.

Black moss (*Alectoria fremonti*), which attaches itself principally to standing trees, is probably the most palatable and the most nutritious big game food found in the forests. It is found in both east-side and

west-side forests. Chemical analysis has shown its protein content to be three to five times greater than alfalfa. Bull elk have been known to use their antlers as well as their weight to pull down small lodgepole trees just to get the black moss. Its occurrence within reach of deer or elk is quite limited, but on many east-side sale areas the deer will start picking the black moss from the fallen tops before the loggers quit work in the evening. This close association of deer and loggers frequently leads to poaching.

Bear

The black bear is also a nuisance and destroyer of timber at times. In the spring when sap begins to flow freely, the bears seem to like the wood sugars found in the cambium of several species of trees. They usually completely girdle trees 6 to 15 inches in diameter, frequently as high as 4 feet above the ground. There is little evidence of species preference in the observations made so far. Western redcedar, western hemlock, white fir, Douglas-fir, and ponderosa pine have been girdled in this way. Usually this damage is only incidental, but one owner near Mt. Hood, Oregon, had about 20 trees per acre on 160 acres destroyed by bears in this way. Some acres had more. Usually, however, the damaged trees are much less frequent.

Porcupine

Another culprit of the wildlife gang is the porcupine (*Erethizon epixanthum epixanthum*). Our trouble with him is mostly in the southern part of the region. Large areas of reproduction have been heavily damaged by porcupines girdling the pine tree trunks occasionally at the ground line but usually near the top where the bark is thin. Some work has been seen 90 to 100 feet above the ground. Their choice is usually pine but ponderosa, lodgepole, sugar, or white pine appear to create no preference. However, when appetite suggests, they will eat oak, Douglas-fir, white fir, or mountainmahogany. They are principally ground feeders in summer, but during the winters they will spend the daylight hours roosting in large "rest" trees and the nights rustling food by way of girdling smaller trees.

Squirrels

One of the least suspected animals to damage forest trees is the silver gray squirrel (*Sciurus griseus griseus*). At times and places, but principally in western Washington, this beautiful little animal persists in chipping the bark from fir trees 20 to 60 years old. The favorite trees appear to be the dominant and most vigorous of a group. They will completely girdle the tree anywhere from 6 to 15 feet from the top by removing the bark from a strip 3 inches to 1 foot in width. Frequently two or three bands are girdled. After the top dies it is usually broken out by wind or wet snow. It appears to be a food attraction that excites all the work, as most of the damage occurs in late winter and early spring. On large areas the damage is insignificant but on farm forests and small ownerships this loss is frequently considerable.

Beaver

Another and important group that damages the forests is rodents. While rodents include a wide variety from mice to beavers, only a few are important as influencing forests.

Beavers (*Castor canadensis pacificus*) are by far the most important in this region from an economic standpoint. They produce from $60,000 to $100,000 in raw furs annually, depending on the market value of furs. While much of this region is not considered ideal beaver habitat, still many find suitable habitat along the west-side rivers without the necessity of dam building or food storage. On the eastern slopes where food is limited and regrowth slow, beavers have damaged many miles of stream bottom, leaving them less productive and attractive than before use. Part of this trouble was our own lack of information on what was beaver habitat, and part our failure to keep the many groups controlled to the production capacity of the site. The principal effect on timber-producing trees is their destruction by flooding. This is not too important.

Mountain Beaver

The mountain beaver (*Aplodontia rufa rufa*) has been accused of many things, and no doubt is guilty of some of them. His favorite method of eating is to cut weeds, grass, and tree twigs and drag them to his burrow to be eaten at his leisure. Their burrows are usually found only in wet places but this does not apply along the immediate coast where their is sufficient rain to satisfy the animals on any lands.

The damage by mountain beaver varies by localities and generally occurs on the west side. On a plantation on the Olympic Peninsula the animals cut from 70 to 80 percent of the planted trees as determined by a check five years after planting. The area was then treated with poison and no more damage occurred. Now the area looks good and one cannot see any damage done by mountain beavers.

In Thurston County, Washington, most of the damage by mountain beaver is cutting branches 5 to 10 feet from the ground from saplings 10 to 15 years old. This seldom kills a tree and in a few years is unnoticeable. The mountain beaver has little choice of plants and will take most any tree or weed within his radius of operations. Occasionally with snow on the ground mountain beaver will girdle saplings close to the ground line. This of course kills the tree but it usually occurs where the loss of an occasional tree is not a serious matter. While the damage to plantations from these animals is positive and severe in localized areas, over the region as a whole it is not serious.

Another source of trouble with mountain beaver is the damage they do to roads and trails. The animals build a system of tunnels or runways close to the surface of the ground. Occasionally they are daylighted by openings. Many of these tunnels make good places for surface water to follow, and occasionally they become bad washes. They are a constant menace to horse and man following trails where the beaver are numerous.

Rabbits

Another vandal of the west side is the rabbit, and it occasionally

causes considerable trouble with plantations. The principal offender is the snowshoe or varying hare (*Lepus americanus*). Their favorite method of forest control is to browse the terminal shoot of seedlings and young trees 8 to 10 inches high. On test areas this has been done so many times that the tree takes on a bushy appearance. When that happens one of the leaders usually gets away and makes a tree. The redwood brush rabbit (*Sylvilagus bachmani ubericolor*) found principally in western Oregon causes some trouble with new plantings along the immediate coast area. True to name, he stays close to the brush and foresters have found it pays to plant their trees 15 to 20 feet away from brush piles. Rabbit work is very much like that of mountain beaver except that the rabbit eats his food at the place obtained instead of dragging it to a burrow as does the mountain beaver.

Meadow mice (*Microtis montanus*) have about exterminated sizeable areas of bitterbrush which is the important deer winter forage. Here we have a small rodent reducing the food of a large animal to the extent that the populations of deer must be reduced much below their summer range capacity if they are to survive in winter.

Population Control

The question then is, What are we going to do about these interrelationships to keep the forests growing and at the same time maintain all phases of wildlife production consistent with the main objectives for managing the land?

The one general answer is control of the wildlife populations causing the damage. Sometimes, however, that control may mean elimination in the area where the damage is important. The first thing to do is determine which resource should have the preference and then seek to minimize the damage to a point that is acceptable to the maintenance of the principal resource.

Deer, for example, need control for their well-being. They are prolific breeders and under favorable conditions will double in number in three or four years. The ranges of course have a capacity limit, and a herd of deer will soon build up to that limit if not retarded by control measures. But the herd continues to reproduce even though the range capacity is reached. The difference is, however, that natural factors take care of those deer produced above the capacity limit. Another point is that each year a range is subjected to excessive use, the production capacity of that range is lowered.

When a range continues to produce about the same number of bucks year after year, it is safe to say the limit of production is reached. The inside story, however, is that as many does as buck are produced each year but nature must dispose of the does while the hunter kills the bucks.

Severe winters, predators, and disease are only a few of the agents that reduce game herds. If it were not for those agents, however, we would be overrun with deer. At the recent meeting of the Western Association of State Game and Fish Commissioners the one theme through the four-day meeting was the inadequate harvest of the deer crop. This is not only an economic waste of sport and good meat, but the range is being punished and its production lowered annually. The buck law is a good tool to increase deer herds, but it is equally destructive when used beyond its need.

Winter usually weakens the animals, and predators and disease take the final death toll. I am one who believes that game controls predators, but I have to concede that in localized places predators do considerable damage. However, I cannot see either the logic or the economy of spending money to control predators where we have too many deer. Deer can only escape disease and parasites through isolation and good food supplies. Thus good game management points to good forest management and good game management is 99 percent game control.

As an example, the state of Washington reached the peak of buck deer production in about 1942 when 25,000 bucks were killed. Since that time the kill has declined and it looks as if 20,000 bucks might be the annual harvest. Somewhere over 20,000 does are being lost annually, otherwise more bucks would be produced. Those same 20,000 does could be taken up by the hunters and not reduce the breeding potential of the herd but merely harvest the surplus. When that system of harvest is applied there will be much less deer damage to forest trees and twice as many satisfied hunters.

It may be necessary in some sections of the state practically to eliminate the deer population by hunting for a period of years so that a desired timber species such as Port Orford white-cedar can be established.

The handling of the elk problem is about the same as the deer problem. However, it may be necessary to remove elk entirely where the browse is completely gone or rapidly declining, since it is doubtful whether an elk herd will thrive without browse. Elk are strong and resourceful animals and will stand more intense hunting than deer. Liberal bag limits and seasons are necessary to keep these animals in check, as their self-preservation is remarkable.

It is interesting how porcupines maintain their numbers when one considers that females usually produce only one young annually. They are slow and awkward travelers and in the early days were protected by many states because they were so easily taken for food by woodsmen or lost persons. There is still that feeling with many people that they should be protected, and this attitude no doubt saves many animals from destruction.

Control projects on the Rogue River National Forest have accounted for over 400 porcupines in one ranger district in the past two years. But still a good population is evident. Poison stations were tried with only fair results.

Poison has been successfully tried in other places, however. The method was to make small poison blocks and place them in "rest" trees 20 to 30 feet above the ground. It requires well-practiced eyes to locate the "rest" trees, but the success of the poison system de-

pends on proper placement of the blocks.

Night hunting in summer proved most effective on the Rogue River forest. Armed with a flashlight and an axe, the hunter frequently finds the porcupine ambling along a road or trail, or he may be located in a nearby tree from where the tracks leave the path. Some are occasionally found in open meadows seeking water and food.

In winter the porcupine spends most of the day in "rest" trees. Shooting is an effective method of control during the winter months.

The black bear has no natural enemy in this region since there are practically no grizzlys here. He is also a hard animal to hunt unless one has dogs for tracking. In Oregon the bear may be killed at any time, and in western Washington except on national forests. The forests were excepted to protect fishermen, campers, and berry pickers. East of the mountains in Washington the bear season coincides with the deer season. Possibly we need to advertise bear hunting for trophies in the spring. Here we cannot get the hunters to hunt them, but in North Carolina where six bear hunts were advertised at $50 for each hunt, over $35,000 was received in applications for the six hunts.

Usually the damage by bears is not too serious but, where it is, eliminating the bears responsible is about the only way to solve the problem. Bears are becoming bothersome in several places in this region, raiding orchards and bee stands, and some form of control will have to be started soon. The damage to the forests as a whole, however, is quite insignificant.

Squirrel damage is pretty much localized. In 1948 the season on gray squirrels was closed, but an open season of one month is allowed in 1949. However, it is doubtful if one month of hunting will be very effective. Squirrels are very clever animals and can hide most successfully. Where the damage is serious the only remedy is to remove the offenders. If the effective open season is not adequate, permission can usually be obtained to remove wild animals that are destroying personal property. Such requests should be taken to the game department.

Rodent damage, such as was caused by the meadow mouse epidemic, is one of those things inflicted upon us to try our patience. The reasons for the start or finish of epidemics are not fully known, and there is little that can be done while they are in progress. Some biologists believe now that epidemic irruptions are due to unusual sources of vitamins which stimulate abnormal increases in population. Usually the damage is well along before the severity of the epidemic is known. Our principal assurance is that they are cyclic and not continuous. But that may not be much consolation when they kill shrubs that take from 25 to 50 years to grow.

Mountain beavers are a little different. They live a rather stabilized life, working over the same areas as long as food is available. Where planting is contemplated in an area heavily populated with the mountain beaver, trapping is suggested as one means of cleaning out the animals. Poison can be used effectively by dropping in the open runways. Used this way it does not harm other animals in the forest. Large areas will not warrant such treatment, but usually the mountain beaver is found in rather limited areas that are not too large for treatment.

Rabbits are the important food of bobcats, coyotes, and cougars. Where the rabbits are a problem the enemy predators should not be exterminated but given a chance to do something constructive. If artificial control measures are necessary, trapping is recommended as the safest. Experiments are being tried with repellents, but they have to be used each year until the damage period is over.

Conclusion

Thus we find wildlife-forest relationships complicated in some respects but fairly simple in others. The pattern of land use is narrowing down the permanent forest areas and wildlife habitat as well. The use of both these resources is increasing and the administrator's job is to make the habitat produce the maximum it can sustain in both timber and wildlife. To do this requires intensive and sensible management based on facts and values commensurate with the resource in question.

If good practical management is applied to wildlife the forests will not suffer, and if the same kind of management is applied to the forests, wildlife will have a good habitat for a long time to come.

Cold Soaking— A Short-Cut Substitute For Stratification?

Paul O. Rudolf

Lakes States Forest Experiment Station, maintained by the U. S. Department of Agriculture, Forest Service, at University Farm, St. Paul, Minn., in cooperation with the University of Minnesota.

Exploratory tests indicate that cold-water soaking of seeds of some Lake States conifers for one to two weeks may be as effective in overcoming internal dormancy as cold stratification for one to three months.

SEVERAL Lake States conifers have seeds which require from 30 to 90 days moist cold stratification to induce reasonably prompt germination. Any treatments equally effective which would act more rapidly and not be too difficult to apply would be very useful to seed testers and nurserymen. For this reason the results of some exploratory cold-soaking tests made at the Lake States Forest Experiment Station should be of interest.

Seeds with internal dormancy, such as eastern white pine or white spruce, usually are fall-sown in Lake States forest nurseries. Prior to laboratory testing or spring sowing, where necessary, the practice has been to stratify them in moist sand or peat at temperatures a little above freezing. A modification sometimes used in seed laboratories is pre-chilling, in which the seeds are held at low temperatures on pads, kept moistened by wicks (*1*). Some studies have shown no increase (*2*) or slight increase in germination (*3*) of seeds of some of these species when soaked in water at room temperature before sowing. Pretreatment of such seeds by prolonged soaking in cold water has not been reported previously, but some unpublished studies[1] showed favorable effects of such treatment on white pine seed.

Early in 1949, seed from the national forests in Minnesota, Wisconsin and Michigan was sent to the Lake States Forest Experiment Station for testing, and provided an opportunity to compare cold-soaking with standard stratification treatments for these species. Among them were samples of eastern white pine, white spruce, black spruce, tamarack, and balsam fir.

[1]Wood, Raymond J. Water soaking pregermination treatment of seed. Unpub. Master's thesis, University of Minnesota, June 1949, 67 pp. (typescript).

How the Tests Were Made

Standard practices developed at the Lake States Forest Experiment Station were used. The seeds were sown in sand flats. They were germinated in a chamber in which temperatures fluctuated from 68°F (night) to 86°F (day). They were watered with distilled water. Seed were sown at depths of $\frac{3}{8}$-inch for white pine, $\frac{1}{4}$-inch for balsam fir, and $\frac{1}{8}$-inch for the spruces and tamarack. For each lot, four subsamples of 250 seed each were sown in different flats. Flats of white pine and black spruce were moistened and held at 41°F for 60 days before removal to the germination room. Flats of tamarack were so stratified for 30 days. Flats of balsam fir and white spruce were given 90 days stratification. However, four lots of white spruce seed were removed from the cold room after 60 days because germination had already started.

In addition to these standard pretreatments, subsamples of each seed lot were germinated without pretreatment and others were placed in distilled water at 41°F as follows: 4 samples of white pine for 7 days, and 2 of them for 14 days; 10 samples of white spruce for 14 days, and 6 of them for 7 days; 2 lots of black spruce and 1 lot of tamarack for both 7 and 14 days; and 1 lot of balsam fir for 14 days. The water was changed thrice weekly, except for two supplementary lots of white spruce and tamarack, which were changed weekly. The soaked seeds were dried superficially before sowing.

Tests Results Promising

In these exploratory tests, cold-soaking produced about as good germination in 40 days as did stratification (Table 1). In all cases soaked seed germinated much better than untreated seed. Both treatments gave germination capacities quite close to the potential germination.

Cold-soaked white spruce seed gave about as good germination as 60- or 90-day stratified seeds. Germinative energy for seed 1 to 4 years old[2] was about the same whether soaked or stratified. Fresh seed, on the other hand, reached the peak of germination much earlier when soaked 14 days than when stratified. Even the seed soaked 7 days was somewhat quicker in reaching the germination peak than was the stratified seed. Soaking for 14 days induced a little higher germination than did soaking for 7 days.

Four samples of eastern white pine seed which was soaked for 7 days germinated about 6 percent below the 60-day stratified seed. The peak of germination was reached less rapidly for the soaked seed. Indications for two tests were that 14 days soaking was a little better than 7. More tests would be required to establish this difference. All the white pine seed samples had been stored one or two years. Fresh seed might have responded to soaking more rapidly.

Two lots of black spruce seed, 8 and 12 years old, germinated as well after cold soaking for 7 or 14 days as they did after 60 days cold stratification. Germinative energy was reached earlier in both soaking treatments, especially the longer one.

The single lot of tamarack seed, 1 year old, responded as well to 14 days cold soaking as to 30 days stratification. There was practically no response though to 7 days soaking.

The single lot of balsam fir seed, 1 year old, responded to 14 days

[2]All seed lots not collected in 1948 had been stored in sealed cans in standard Forest Service seed houses. Temperatures are not controlled, but because of the construction used do not fluctuate widely.

cold soaking, but germination at 40 days was only about half that of 90-day stratified seed. Apparently a longer soaking treatment was needed.

In the two instances where comparisons were possible, it appeared that changing the water weekly was as satisfactory as changing it more often.

Value of Tests

These tests were exploratory and leave a great many questions to be answered, such as the best temperatures and lengths of treatment for various species, origins, and ages of seed. Nevertheless, cold-soaking gave such consistently good results that it promises to provide a reliable short-cut substitute for cold stratification. In these tests it saved from 25 to 60 percent of the total time required for tests when stratification was used. If it could be used regularly in testing seeds with internal dormancy, cold-soaking might thus save a considerable part of the cost with little loss in accuracy. Emergency spring sowing of such species in the nursery or field would also become feasible if only one to two weeks cold-soaking were required. They would be out of the question if 60 to 90 days stratification were needed.

Cold-soaking has shown sufficient promise in these tests to warrant further study to work out details as to temperatures, durations, possible onset of secondary dormancy after treatment, permissible amounts of drying after treatment, and similar problems. It may then find a place as an accepted pretreatment for certain seeds with internal dormancy.

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TABLE 1.—EFFECTIVENESS OF WATER-SOAKING IN OVERCOMING DORMANCY OF CERTAIN CONIFER SEEDS

Origin National forests	Year collected	Seeds per pound	Purity	Potential germination	Germinative energy				Germination at 40 days			
					Untreated	Stratified[1]	Water soaked[2] 7 days	Water soaked[2] 14 days	Untreated	Stratified[1]	Water soaked[2] 7 days	Water soaked[2] 14 days
		Number	*Percent*	*Percent*	*Days*	*Percent*	*Days*	*Percent*	*Days*	*Percent*	*Percent*	*Percent*
						WHITE SPRUCE						
Upper Michigan	1944	205,298	94	66	30	42	15	31	14	63	58	58
Chequamegon, Wis.	1944	261,692	97	59	14	26	30	15	31	17	56	53	53
Chippewa, Minn.	1944	268,158	96	57	15	55	40	21	—	41	55	47	47
Superior, Minn.	1944	275,439	94	59	39	26	35	20	—	48	55	53	53
Superior, Minn.	1947	260,712	92	46	28	19	31	16	—	32	44	38	38
Superior, Minn.	1948	199,050	96	75	41	36	60	16	55	54	73	68	70
Upper Michigan	1948	193,910	98	66	41	25	48	16	45	13	39	64	65
Nicolet, Wis.	1948	214,429	97	70	43	30	51	20	51	15	38	69	67	65
Chequamegon, Wis.	1948	241,586	98	72	30	22	54	20	47	15	47	46	70	71	65
Ottawa, Mich.	1948	194,262	97	70	31	22	49	18	44	13	39	49	9	34	68	68	67
Average—old seed		242,260	95	57	20	25	36	17			39		21	27	55	50	
Average—fresh seed		208,647	97	71	37	27	52	18	48	14	45		7	43	69	68	
Average—all seed		225,454	96	64	28	26	44	18			42		14	35	62	59	59
						EASTERN WHITE PINE						
Nicolet, Wis.	1946	27,752	95	88	22	27	80	20	64	22				36	86	86	83
Nicolet, Wis.	1946	27,137	96	88	34	26	74	20	69	22	50		17	40	86	77	83
Lower Michigan	1947	28,435	98	49	14	35	39	20	20	22				44	44	35	
Lower Michigan	1947	24,878	96	61	30	35	43	20	59	22	41		22	37	58	51	49
Average		27,050	96	72	25	31	57	20	45	22				34	68	62	
						BLACK SPRUCE						
Superior, Minn.	1936	364,320	93	65	26	24	41	21	48	17	34	14		37	59	62	
Chequamegon, Wis.	1940	310,213	93	87	58	25	61	17	64	15	65	4		64	86	86	61
Average		337,266	93	76	42	24	51	19	56	16	50	9		50	72	74	61
						TAMARACK						
Chippewa, Minn.	1947	333,710	95	55	18	35	49	25	29	15	43	26		29	52	21	53
						BALSAM FIR						
Superior, Minn.	1947	70,646	95	39	—	—	33	30	—	11	28	—		4	37	—	18

[1] Stratified in moist sand at 41° F for 30 days for tamarack, 60 days for white pine and black spruce, and 90 days for white spruce and balsam fir.
[2] Soaked in distilled water at 41° F, water changed thrice weekly.
[3] Stratified only 60 days since germination was starting in the cold room.

Genetics in Relation to Forestry

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FORESTRY is so young in comparison to agriculture that it is just beginning to experience the embarrassments and perplexities of adolescence, but it is following much the same evolutionary pattern. Prehistoric man probably started the slow advance of agriculture by protecting wild plants that he found necessary or useful to his existence; and then gradually developed his crude culture of such native plants in more convenient locations.

Even the aboriginal farmers must have selected outstanding natural variants that appeared among their crop plants; thousands of years of selection is evidenced by the fact that the wild progenitors of many of our presently cultivated crops are unknown. But intensive work on the deliberate improvement of agricultural plants stems back hardly a century, and research in fields basic to scientific agriculture, such as plant physiology and soil science, is just as recent. The evolution of agriculture is thus a story of protection followed by slow improvement in methods of planting, culturing, and harvesting the useful plants nature had provided. Agriculture was an art for thousands of years; it has only recently started to become a science.

Forestry has followed, and apparently will continue to follow, much the same pattern. Forest protection in Europe can be dated from the time of Charlemagne, but it was only within the past two hundred years that European foresters began to acquire the empirical "know-how" essential to the art of forestry. In the United States, even protection dates back less than half a century, and we are just beginning to develop our cultural methods.

The recent history of agriculture leaves no doubt that, without basic research in such fields as plant genetics, physiology, and soil science, progress would be greatly retarded. Therefore, even at this early stage in the development of forestry, our present extremely urgent need for the empirical "know-how" to manage our existing forests should not be allowed to overshadow completely the need for basic biological investigations on forest trees.

First Studies on Inheritance

European foresters first became aware of the importance of inheritance and variation in forest trees during the middle 1800's. Extensive areas throughout Europe had been reforested without regard to the source (i.e. the race) from which the tree seed was obtained. This oversight was particularly serious in the case of Scotch pine, because inferior races of this species were widely distributed, and all such plantations developed into stands of crooked trees unsuitable for saw timber. During the last quarter of the past century, many investigations were started on racial variation in forest tree species and the suitability of these races for planting in specific localities. At the present time this problem is still the major forest genetics activity in Europe.

Foresters then, and in general even today, recognized the practical importance of inheritance merely from the standpoint of racial adaptability to local environmental conditions. Snow and Duffield (*11*) had this in mind when they wrote:

> Foresters have often urged the public to regard the forest as a crop. It seems quite appropriate to urge foresters to consider forest tree improvement as analogous to the improvement of any other crop plant. The agricultural plant breeder has not been content merely to introduce promising types from other regions or confine himself to selections, nor has he hesitated to undertake fundamental genetical investigations. The unquestioned success of his results can be duplicated in a program of forest tree improvement based on controlled breeding and fundamental investigations in forest genetics.

Obviously, selection for racial adaptability to local environmental conditions, mere acceptance of the best that nature can provide, can hardly be called improvement. Genetical improvement implies the development of timber stands that are inherently better than nature's best. This will require controlled breeding, to create better trees for forestation, and to secure the exact information on heredity and variation essential for genetical improvement of our natural stands by mass selection.

This role of scientific breeding in the advancement of agriculture is common knowledge. Cultural methods reach a limit beyond which production can only be increased, or even maintained in cases of susceptibility to disease, by genetic improvement of the crop plants.

Early Tree Breeding

M. Klotzsch, in Berlin, apparently produced the first artificial hybrids between forest trees in 1845, when he hybridized two species each of pine, oak, elm, and alder. He reported (*5*) that after eight years the hybrids were one-third stronger and larger than seedlings of the parent species. Additional sporadic tree breeding in Europe, and later in this country, proved that the hybrid vigor observed in agricultural plants also occurred in hybrids between some species of forest trees. Since forestation requires a long-term investment, with little intermediate return, this possibility of faster growth has been the lodestar of almost all forest tree breeding; but there have been exceptions.

Chestnut breeding was first started by Dr. Walter Van Fleet (*15*) in 1894 to improve nut quality. By 1909 the chestnut blight had so seriously ravaged our American chestnut that the Division of Forest Pathology, U. S. Department of Agriculture, employed him on a part-time basis to breed blight-resistant trees. After a few years of breeding the project reverted to a maintenance basis, but in the late 1920's the Division of Forest Pathology revitalized this work. The major objective is to produce a blight-resistant chestnut with good timber form, and many promising hybrids are under test.

Augustine Henry, professor of forestry at the Royal College of Science, Dublin, was probably the first forester to strongly advocate

tree breeding. In 1910 (*4*) he urged that:

> In countries like our own, the only hope of salvation for forestry is in growing timber rapidly. . . . We are ourselves making some experiments in cross fertilization this year; but more workers are required in this field. Hitherto nothing whatever has been done to improve the breeds of forest trees; and foresters have never even thought of the possibilities in this direction, though gardeners and farmers have shown the way for centuries.

In the United States, East and Hays (*2*) advocated the use of hybrid seed for forest planting in 1912:

> Many plans for breeding forest trees have been suggested yet we have never seen the use of first-generation hybrids suggested. . . . It is perfectly evident that hybrid seeds will be impossible in many cases, and even where hybrids can be produced comparatively few can be crossed at a small enough cost to make the scheme a commercial success. On the other hand, we have no doubt that with many good lumber trees crossing would be found easy and hybrid seed could be sold with a wide margin of profit both to producer and to forester.

Additional articles on the possibilities of tree breeding were published previous to 1912, and many have appeared since. The results of controlled breeding with forest trees were reported from time to time, but previous to 1924 these tree-breeding efforts were sporadic, usually "extra-curriculum" activities of individuals otherwise employed.

Large-Scale Tree Breeding—A Child of Prosperity

Although the urge to hybridize forest trees is more than a hundred years old, Easter Monday, April 21, 1924, marked the birthday of what was apparently the first large-scale breeding project in the world devoted exclusively to the improvement of forest trees (*13, 14*). The objective was to produce rapid-growing poplar hybrids for pulpwood reforestation. The project was financed by the Oxford Paper Company of Rumford, Maine, and was carried on in cooperation with the New York Botanical Garden. Dr. A. B. Stout, Director of Laboratories at the Botanical Garden, was directly and solely responsible for the planning and direction of the breeding work. In 1936 the company transferred all of its hybrids and breeding records to the U. S. Forest Service, and since that time the poplar work has been a part of the forest genetics project of the Northeastern Forest Experiment Station.

The times were different in 1924. They were good times and most of us thought of them as "normal"; and hoped they would last forever. If there were any prognostications of depression they were relegated to academic discussion. What the well-dressed man should wear made the news and prohibition was providing the sensational headlines. Yes, the times were different, nevertheless a few Easter weekend headlines from the *New York Times* and the *Herald Tribune* indicate that in some respects they were a preview of 1949, but without our present uncertainty of the immediate years to come. We had a plan for aiding Europe—"Marx Foresees Election Victory for Dawes Plan"; we were still figuring the cost of the World War—"$80,680,000,000 Estimated as Cost of World Conflict"; and were impatient to clear up the aftermath—"Paris Criticizes Reparation Body, Plea for Speed"; radio then was even younger than television is today—"Eleven Stations to Radiate Coolidge Speech on Tuesday."

What have these headlines to do with tree breeding? Nothing directly, except that it seems to require times like 1924—prosperous, so-called normal times without the shadow of impending recession—to bear and successfully cradle such basic forest research. Since then, depression and war have twice brought this child of prosperity close to the brink of oblivion.

The cooperative poplar breeding project of the Oxford Paper Company and the New York Botanical Garden was a long time a-borning, and its history typifies the tortuous development of fundamental scientific research in this practical world of ours. This project owed its origin to the persistence of Dr. R. H. McKee, a professor of chemistry closely associated with the paper industry. Impressed by the writings and hybridization results of Augustine Henry, he urged the pulp and paper industry, in 1916, to consider hybridization of poplars to produce fast-growing hybrids for pulpwood reforestation (*7*). Fortunately, McKee was not content merely to write a paper on the hybridization of poplars. He continued his efforts for an action program until the financial support and cooperation necessary for such a project were secured in the spring of 1924.

Forest Genetics Research Today

Since 1924, many additional forest-tree improvement projects have been initiated in the United States and in almost every major country around the globe. The Eddy Tree Breeding Station (*1*) for the improvement of pines was started at Placerville, California, in 1925. This station later became the Institute of Forest Genetics, a branch of the California Forest and Range Experiment Station, and today it is the leading pine breeding station in the world. Forest tree breeding is underway on a long-term endowment at Harvard University, and tree breeding or tree selection projects have been established at many other universities and experiment stations throughout the United States.

Although twenty years ago the United States was well in the vanguard, at present Sweden appears to be leading the world in its efforts in this field. The 1947 annual budget of the Forest Tree Breeding Institute, Ekebo, Källstorp, which at present is the largest forest genetics unit in Sweden, was 418,576.70 Sw. Krs. (about $120,000); approximately 10 percent government funds, the remainder grants from forest companies. This budget is exclusive of a large amount of help in the field, such as planting in connection with progeny tests, which is handled by the forest districts' crews without cost to the institute. The institute employed 9 professional and 17 nonprofessional workers on a full-time basis and approximately 30 additional workers during the growing season.

Other Swedish organizations are also active in this field. The Forestry Research Institute of the government recently started a Department of Genetics with two professional men and an initial annual budget of perhaps 50,000 Sw. Krs. Several Swedish forest industries, county forestry boards, and other

such organizations are also carrying on tree improvement work including the location, mapping, selection, propagation, and testing of select races and elite individual trees. It is impossible to determine accurately the annual expenditure for forest tree improvement throughout Sweden, but on the basis of relative purchasing power it is probably equivalent to at least a quarter million dollars, American. This is at least twice the 1947 expenditures for forest tree improvement by public, academic, and private agencies in the United States.

Objectives of Forest Genetics

The specific objectives of forest genetics are numerous and diverse. This was apparent from replies received in 1936 to a questionnaire (*9*) requesting information on investigations pertaining to forest tree improvement. In my opinion, genetics in relation to forestry implies two broad objectives, both of which will require the accumulation, interpretation, and application of sound information on heredity and variation. Briefly stated these objectives are:

1. Production of improved forest trees for forestation.

2. Genetic improvement of native forest stands that are managed under a system of natural regeneration.

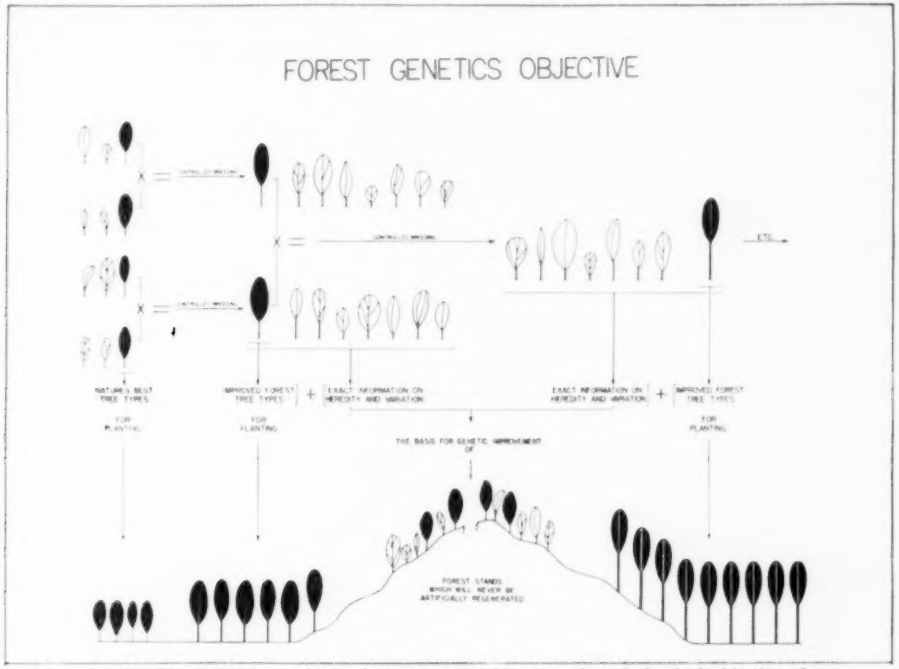
Our reforestation problem justifies intensive efforts to create improved trees for forest planting. The seriousness of this problem is apparent from the following quotation taken from "Some Plain Facts About the Forests" (*3*):

> Much of the artificial reforestation is a rehabilitation measure to correct past mistakes. Millions of acres of denuded forest lands in the United States will need to be replanted if they are to be restored to productivity in any reasonable time. The National Resources Board has recommended a 25 year planting program covering 25 million acres. But even when an area is planted we have to wait 50 to 100 years or more before the seedlings grow into good quality saw timber.

The second objective applies to the many more millions of timbered acres that will never be clearcut and replanted. Gradual genetic improvement of these natural forests is practicable through roguing (thinnings and intermediate cuttings) and seed-tree selection. But to rogue his stands and favor inherently good trees as the progenitors of each succeeding generation, the practical forester will need criteria for excellent breeding quality. Such criteria can only be established by the forest geneticist on the basis of accurate information on inheritance and variation.

Modus Operandi

The approach to forest tree improvement must differ from that used for agricultural crops, or even fruit trees, for more reasons than can be encompassed herein. The forest geneticist is dealing with trees that require many years to reach commercial maturity. For some characters, such as rate of growth, hardiness, disease, and insect resistance, juvenile criteria of excellence are available for preliminary selection. But for a final analysis every select race or new type will have to be grown in forest stands under various climatic


FOREST GENETICS OBJECTIVE
NATURE'S BEST TREE TYPES
FOR PLANTING
IMPROVED FOREST TREE TYPES
FOR PLANTING
EXACT INFORMATION ON HEREDITY AND VARIATION
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THE BASIS FOR GENETIC IMPROVEMENT OF
FOREST STANDS WHICH WILL NEVER BE ARTIFICIALLY REGENERATED

FIG. 1.—The author has endeavored to pictorialize his conception of the dual objective of genetics in relation to practical forestry.

conditions until maturity. The final proof is in the harvest.

The forest geneticist must work with wild stocks subjected only to natural selection, stocks never subjected to the cultural selection of man. Theoretically the improvement of any wild stock probably should begin with (1) segregation and evaluation of the racial components in the wild population, and selection of inherently excellent races and individuals; followed by (2) use of the best germplasm available in the wild stocks, for selective breeding and for the production of decidedly new types by hybridization and by advantageous use of natural or induced differences in the number of chromosomes (polyploidy). The improvement of forest trees strictly along these lines would require extensive field investigations and progeny tests over many years.

The following arguments, for the application of our presently available genetics facilities to continued hybridization, are not intended to minimize the tremendous importance of eventual evaluation of our native stocks, the selection of outstanding varieties and individuals, and selective breeding between such individuals.

The Future of Hybridization

During the next decade, species and varietal hybridization will continue to offer highly profitable employment for the predictable forest genetics personnel. Rate of growth is an exceedingly important factor in the economics of reforestation, and there undoubtedly will be an ever increasing demand for more rapid-growing trees for forest planting. We no longer need guess that hybrid trees can provide the earliest return on a reforestation investment. Hybrid vigor has been reported for some first-generation (F_1) species crosses in many genera, including basswoods, catalpas, elms, oaks, pines, poplars, and walnuts.

The results of pine hybridization at the Institute of Forest Genetics have prompted the following prediction by Stockwell and Righter: (*12*)

> Soon there will be hybrid forest trees that may grow to harvesting size in one-half or one third the time required for a good, nonhybrid timber tree to reach the same size. Our forests and farm wood lots, where planting is practiced, might then be made to produce twice or three times the volume of timber that would be produced by planting standard stock or letting natural growth populate the site.
>
> Already we have a hybrid pine, that at 3 years is more than twice as high and three times as heavy as the better of its two parents. So, a new era is beginning in reforestation and, although the hybridizing of forest trees seems to be at about the same stage that hybridization of corn had reached in the mid-1920's and failures and disappointments are to be expected along the way, we confidently predict that in another 20 years the forester will be using and discussing hybrid tree strains as casually as Midwest farmers now discuss their hybrid corn.

The poplar hybridization project, now carried on at the Northeastern Forest Experiment Station, has demonstrated the possibilities for improvement in many important characters. The original hybrids have already reached merchantable size, and their rapid growth has been demonstrated in western Maine where the growing season is relatively short. Approximately 13,000 hybrids, representing 99 combinations between 34 different kinds of poplars, were originally planted 6 by 6 feet apart on cut-over forest land (*11*). The actual growth of the best 50 percent of these hybrids indicates that hybrid poplars can produce at least 40 cords of pulpwood per acre in 15 years (*10*). Under the same conditions the most rapid-growing native species in western Maine would require at least 35 years to produce an equal quantity of merchantable wood per acre.

The poplar hybrids have also demonstrated that species hybridization can produce individual trees that combine hybrid vigor with good timber form, increased hardiness, and greater resistance to disease and insects; that combinations of desirable economic characters can be obtained literally in "one jump." Many of these combinations were unexpected, since the characters of the parent trees did not provide a basis for predicting the characteristics that appeared in the hybrids. Such unpredictable but fortunate combinations of economic characters are not limited to poplars; corroborative results have been reported for other hardwoods and for conifers.

The fact that in forest trees major improvements in economic characters (in addition to hybrid vigor) have been obtained in the first generation, appears to fit Knight's (*6*) hypothesis on the role of "major" genes and "pre-adaptation" in the evolution of economic characters in agricultural crops. This promises much more rapid progress in tree improvement than could be expected on the basis of the more generally accepted polygene concept.

A final argument for controlled hybridization is the fact that it will begin to provide exact information on inheritance and variation in forest trees, the foundation of forest genetics research and of its application to intensive forest management.

"True-Breeding" Trees Not Necessary

A major reason for an apathetic and even pessimistic attitude toward tree breeding has been the erroneous assumption that the improvement of forest trees will necessitate continued breeding for many years to develop true-breeding types. Forest management rightly envisions natural regeneration as almost a silvicultural obligation, and looks upon reforestation as a necessary measure to repair misuse or catastrophy. So the idea of replanting with F_1 hybrids after each harvest, as in the case of hybrid corn, has not been favorably received. Such replanting will not be necessary, but in favorable localities it may well become financially advantageous when highly improved trees are available.

With hybrids such as poplars, which can be cheaply propagated from cuttings, any excellent tree can be multiplied immediately as a clone; every vegetatively propagated individual will possess the same inherent characteristics as the parent tree. And a stand of F_1 hybrid poplar will not need to be replanted because these trees reproduce profusely from root suckers.

All members of a clone are genetically identical. Every tree will possess not only all the excellent characters of the original hybrid, but it will also exhibit, and to the

same degree, all its inherent weaknesses. The situation involves far too great a risk to warrant extensive forest plantations of a single clone. Some new or unexpected environmental factor to which the clone had not been subjected during its trial period, such as climatic extremes, disease or insect epidemics, could wipe out the entire investment. Fortunately, this hazard can be alleviated by using a random mixture of clones for forest planting. A mixed plantation of 50 to 100 selected clones, fairly uniform in growth-rate and representing several or many species crosses, can provide a wider range of variability and therefore a larger margin of safety, than seedlings of a single species.

Considerable research on the vegetative propagation of pines has failed, except for *Pinus radiata*, to provide a cheap, practical method for the propagation of forest planting stock. This problem also applies to many other timber species although there is evidence that for some hardwoods practical methods can be developed. But lack of practical methods for vegetative propagation does not necessarily rule out the use of excellent F_1 hybrids for reforestation.

Righter (8) has presented an excellent case for reforestation with F_1 hybrid seedlings derived from large-scale controlled pollinations. He bases his argument on the fundamental difference between the materials and conditions of agriculture and of silviculture. One basic difference is that "In agriculture a high degree of genetic uniformity is deemed to be essential in the original stand of a crop." Such genetic uniformity is not required in silviculture because "the eventual loss of 90 percent or more of the original stand, which would be ruinous in agriculture, is natural and beneficial in silviculture, which depends on close spacing to insure good stem form and on the gradual elimination of most of the stand through competition to accommodate growth in size."

Stockwell and Righter (12) are confident that forest stands of the hybrid *Pinus attenuradiata*, produced at the Institute of Forest Genetics, would not need to be replanted after each harvest cutting. They report that:

> The first generation hybrids, or F_1 plants are reasonably uniform in growth rate and other characters. Seedlings from these trees representing the second generation of hybrids, or F_2 plants, show great variability. However, a considerable number of the trees (approaching 50 percent) are as good as the F_1 hybrid, and a few are even better. In a stand composed of this F_2 hybrid population there would be enough good trees of the second generation to repopulate the area and crowd out inferior trees before the stand reaches maturity.

Selecting and Testing Elite Races

Racial studies continue to constitute the major activity of European forest genetics research. Such work is amply justified in a country like Sweden where the land area is relatively small, where forest products are a major source of income, where forest management is intensive, and where a rigorous climate drastically limits the number of timber species and the adaptability of local races. The situation is somewhat different in the United States where the climatic conditions in practically every important forest region favor a wide diversity of valuable timber species. Furthermore, in comparison to its importance in Sweden, wood in the United States is a relatively minor commodity, forest management is less intensive, and we have fewer trained foresters per unit of forest area.

Rapid and profitable progress on racial or individual tree selection and evaluation will require the close cooperation of many local foresters. They are in the best position to know their stands, to evaluate growing conditions, and thus to recognize the elite races or individual trees. Without the aid of local foresters, racial studies limited to even a single important species, such as the eastern white pine, would require far greater expenditures for forest genetics research than are available at present or predictable within the next decade.

The forest geneticist must continue preliminary studies of racial and individual variation, but the intensive search for, and field testing of, select natural races and individuals may have to be postponed. Rapid progress will be possible when most professional foresters have a sufficient background in forest genetics to take an active interest in the inherent characteristics of their timber stands. This will depend largely upon the forestry schools.

A Challenge for Forestry Schools

Interest and activity in forest genetics is still limited largely to the research field; the leavening is present but it has hardly begun to make appreciable inroads into the rank and file of the profession. Research activity in the United States has been directed almost entirely toward the improvement of trees for forestation. In terms of land area and economic values, the second half of the objective—the genetical improvement of our natural forest stands—eventually will be the most important. Appreciable progress toward this objective will not be possible until the majority of professional foresters are aware of the importance of inheritance and variation for forest management, are alert to genetical differences, and are looking for inherent variation among their timber trees.

To my knowledge, forest genetics is not an undergraduate requirement in any forestry course. I realize that the technical curricula of our forest schools are bursting at the seams. Nevertheless, elementary forest genetics is an important complement to the technical education of the professional forester, and as such it should be an undergraduate requirement. A one-hour, one-semester lecture course would be sufficient for the present. This should not be an elementary course in general genetics or in agricultural genetics. It should be a course in *forest genetics*, to provide the basis for understanding the relation of genetics to forestry, and to make clear those concepts which will be essential to the genetical improvement of our managed forests.

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The Defense of Forest Recreation Areas Against Overambitious Irrigation, Flood Control, and Water Power Projects

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ON FEBRUARY 2, 1948, at a public hearing at Sheridan, Wyo., conservationists were assembled to plead the case for the preservation of the Cloud Peak Primitive Area. It was a hearing called by the Bureau of Reclamation in response to protests against a proposed dam that would flood the outstanding area of this wilderness. On this occasion Regional Forester John W. Spencer of Denver, in defense of the primitive area, presented testimony that clearly and eloquently stated the wilderness policy of the Forest Service. I quote some introductory paragraphs of his significant statement:

> Full and dispassionate consideration of the proposal to convert Lake Solitude into a storage reservoir involves more than a study of dollar costs and dollar benefits. This particular project raises questions of national forest management policy which should be brought before the general public.
>
> The national forests are public properties held and managed in perpetuity for the fullest and freest benefits to all people for all time.
>
> These forests are not single-purpose units of management and, furthermore, their public values cannot be appraised upon the basis of benefits accruing at any one time or even to any one generation.
>
> It is the responsibility of the Forest Service to preserve through wise use all of the various resources and benefits within these public forests. It is also the responsibility of the Forest Service to look ahead as wisely as we may and forecast as far as possible the anticipated preferences and needs of the people and to develop, or at least preserve, those things which will most fully fill such public wants.

In line with this thinking, the Forest Service some fifteen years ago established a series of primitive or wilderness areas within some of the existing national forests. The greatest proportion by far of the western national forests were carved out of the then public domain. This public domain was land that had always belonged to the Government. Except for some use by trappers, miners, timber cutters, and stockmen, much of this country was still in the same primitive condition as when Columbus discovered America.

The Forest Service felt that this was the final opportunity to preserve for posterity some of the last unspoiled country of our forefathers. With the exception of some national parks and national monuments, the wild country within the forests was the last virgin territory in the continental United States of any consequence.

Such a statement would not have been given twenty-five years ago. At that time there was an abundance of wild country, and it had not occurred to many that it would become desirable to designate roadless areas. But even as early as 1872 our country did create a national park, and we have designated many since then. This represents vision on the part of our leaders of that day. It betokens remarkable vision that a little over fifteen years ago the Forest Service designated certain portions of national forests as primitive areas. It is significant indeed that many years ago the Adirondacks of New York were declared to be dedicated to preservation in the primitive state. And we have the Cook County Forest Preserve, near Chicago, administered as a primitive area. Numerous other situations could be cited.

This clearly demonstrates a trend. This type of recreation is sought with increasing intensity. Many millions of people are visiting our national parks each year. Other millions are seeking recreation in our national forests. What at one time was looked upon as a pleasant vacation, if one had the time or money, has now become part of our way of living. We are proud of our living standards. Recreation must now be looked upon as a part of that standard. It is an element in our social structure.

The fact that our conservation organizations must repeatedly attend hearings in defense of established recreation areas—wilderness areas, national parks, or state parks—points to a serious defect in our governmental structure.

At first we planned our conservation programs with a view to meeting each threat as it arose. The Quetico-Superior canoe wilderness has been a prominent issue for years. We have rushed to the defense of other areas one by one, but it was not until recently that a force so strong and intrenched that it is overwhelming arose to oppose conservationists. The individual threats have coalesced so as to assume the proportions of a military campaign.

We still have to defend our individual treasures, but that is not enough. The only remedy for what is happening to America now is a governmental policy that will meet the needs of modern society.

One example will illustrate what I mean. During the hearing on Lake Solitude at Sheridan, Wyo., such conservation groups as the Wilderness Society, the Izaak Walton League of America, local organizations, and many individuals were pleading for the preservation of an area that had been duly set aside for a special use, in response to a public need, by a well-recognized unit of our federal government. And the Forest Service, through its regional director, was there to defend the land that the American people through Congress had entrusted to its care and administration.

Yet another government unit, ignoring the dedicated purpose of that land feature, without the consent of the Forest Service, and without consulting the general American public, proceeded to superimpose its own plans for the areas, plans that would destroy its original purpose. During the hearings it became apparent that the Bureau of Reclamation of the Department of the Interior was unaware of the significance of a primitive area, or considered it unimportant.

At least in partial explanation of this attitude it must be conceded that the Bureau of Reclamation had grown up during a period when there was an abundance of undedicated land, when there was plenty of room, room enough for many kinds of projects without their clashing too seriously with each other. Now we have suddenly become crowded. With the exigencies of a stepped-up mechanical civilization, in which as sensitive, and somewhat sentient, human organisms we find it necessary to provide a suitable compensating environment, we suddenly discover that the peace and solitude of uncrowded places is not a luxury for the few, but a necessity for the many.

It is not to be expected that a bureau whose function is strictly materialistic, whose stock in trade is engineering skill, can be cognizant of particularized social trends. It is not to be expected that such a bureau would have developed a personnel expert in the intricacies of social needs. It *is* to be expected that to meet the objections of conservationists they would do what they did—have inspections of their projects on the basis of estimating wildlife values in dollars and cents "before and after" so as to have something tangible to weigh against the expected financial benefits of the project.

I do not offer this interpretation as sarcasm. I offer it as a possible explanation of what has happened. I offer it in the spirit of generosity toward the engineering bureau. Just how the Army engineers fit into this picture, I do not know. Nor can many of us understand why they are duplicating the work of an established federal bureau.

Let us remember, too, that there are other agencies working on their own, without correlating their plans with the plans of others. In the October 1949 number of *Sports Afield* the Washington correspondent, Michael Hudoba, reports in part: "Drainage of marshes represents one of the most serious threats to our waterfowl and wildlife resources. At least three Federal agencies—Reclamation, Army, and Agriculture—are standing by with steam shovels at the ready, all set to move in on invaluable marsh areas. . . .

"The Army Engineers already claim authority for drainage of 15 million acres of this country's marshlands. The Reclamation Bureau is seeking to extend its authority to Louisiana and Arkansas as a prelude to extensive drainage projects. The Agriculture Department is interested in a Congressional proposal (H.R. 915) which would ultimately drain 57 million acres of marshlands."

Marshlands are not normally part of forest recreation, but this is part of the situation with which we have to contend.

Our country, as we have known it, is in danger. Our free running streams, one after another, are to be submerged. Rich bottomlands are to be put under water. Roads and engineering structures are to penetrate our recreation areas. Invaluable winter range for big game and marshlands for waterfowl are to be sacrificed. Neither national parks nor national forests are held sacred. In short, our human environment is to be drastically altered on a huge scale; the pattern of our culture is to be seriously affected.

Should individual bureaus have this much power, without consultation with and agreement of other bureaus, and other groups of interested people?

Last August, at Lake Success, I had opportunity to attend the sessions of the International Technical Conference on the Protection of Nature, meeting under the auspices of UNESCO. One panel, under the chairmanship of Dr. Ira N. Gabrielson, had under consideration large scale planned enterprises. One of the questions under consideration was:

"Should the tasks of conservation and of restoration be left to the *goodwill* of the authorities of planned enterprise?"

It was the unanimous opinion of all those present that the answer is *no*.

It was stated: "A planned enterprise is usually undertaken with one or more objectives. The realization of a plan as it was conceived or as it was expedient to carry it out has a multitude of consequences, desired or undesired, foreseen or unforeseen.

"We have never succeeded in getting a full view of the consequences due to the lack of necessary ecological data. What is worse, we have probably never wanted to, or even thought of it. Why? Because a planned enterprise is rarely the work of scientists; it is the work of engineers."

Comments from delegates stressed the fact that engineers, however skilled, were not in a position to assume responsibility for the complex needs of the community. The following proposal was agreed upon:

It is essential, therefore, that a Board of review with the necessary powers:

1. Receive all information about the plan.
2. Be authorized and empowered to get

a full view of the probable consequences of its realization.

3. Decide how it should be modified (the occasion arising in connection with the compensations assured by the government to whoever carries out the plan) to arrive at the greatest benefits not only to the initiators of the work but to the entire community in all respects.

4. Persuade the government that the plan should be modified in the above sense.

It was further concluded: "That the U. S. A. refrain from 'selling' its plans to other places before the operations of this Board of Review have been experimented with and perfected."

This is looking forward. This is stressing something that the conservation organizations of America are earnestly requesting our government to take note of. The huge dam building program now underway, that for the present has caught the imagination of Congress even though the cost runs into astronomical figures, has not had the scrutiny or authoritative advice of those who are concerned with numerous other branches of our social structure.

At the request of a member of Congress, the Legislative Reference Service of the Library of Congress was asked to investigate, on a nation-wide basis, the probable needs for wilderness areas, the trend of thought on this question, and to submit a comprehensive report on the wilderness situation today. Presumably this report will be published in due time.

This is a step in the right direction. This, together with the action taken by the international group at Lake Success, points the way. The Wilderness Society, the Izaak Walton League, and other societies are campaigning vigorously for a change of procedure, by which the huge dam-building programs that are being proposed will not be left in the hands of a single bureau, or, even worse, in the hands of two rival bureaus. We should not have to rush to the defense of individual recreation areas, as projects pop up here and there. We need to slow our pace.

I would urge that we adopt the suggestion of the International Technical Conference for the Protection of Nature at Lake Success, which I have quoted. Such a procedure would insure that the many minority interests of a democratic society will receive fair and reasonable representation in undertakings that so drastically change the face of our country.

Forest-Wildlife Ideologies

The article "Forest-Wildlife Ideologies" by C. R. Gutermuth (November 1949) calls attention to the potentialities for increasing wildlife on forested lands by proper planning of habitat, to the fact that many foresters overlook this important forest resource, and to the possible support of interested people concerned with wildlife in behalf of adequate appropriations for Forest Service wildlife work. With all of these points I strongly concur.

I note that the emphasis in the article is entirely upon wildlife viewed as game, and that the impression is given that the principal public support for these objectives must be hoped for from hunters and fishermen. May I add that there are many additional millions of people, including the 30 million who visited the national parks, the members of scientific and recreational societies and others who enjoy wildlife without a lethal aim, who are sincerely interested in supporting wildlife protection and who can be marshalled behind these efforts? One of the weaknesses of our national program for wildlife preservation, it seems to me, is that much of the expression favoring it is designed to provide more game for hunting than to perpetuate all species of birds and animals for their own intrinsic values. Improved habitat for all forms of life, not only the "game" species, is urgently needed.

Our forests and woodlands can also be improved to enable our endangered fur-bearing mammals to survive in greater numbers, and these can add to the value of our forests. It should not be difficult to enlist the support of groups interested in these animals behind the program Mr. Gutermuth recommends.

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Techniques and Possibilities for Douglas-Fir Breeding

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A technique for controlling pollination in Pseudotsuga is described, and results are presented for small tests including selfing, intra-species crossing, and inter-species crossing. The author discusses possibilities for applying the technique to genetical improvement of Douglas-fir through selective breeding and hybridization.

BREEDERS THE world over are currently remodeling many forest tree species the better to supply human needs (*16*). In North America this work is mostly with pines (*5*) and poplars (*11*). To date little controlled breeding with the genus Pseudotsuga has been reported except by Allen (*2*). Yet interest in the possibilities of genetic improvement of Douglas-fir is growing (*7*). To anticipate the need for reliable breeding techniques for Pseudotsuga, it was decided to make small tests using the procedures already worked out for the pines by Cumming and Righter (*4*) and to determine what adaptations are necessary.

Therefore, in the spring of 1947 controlled pollinations were attempted on two Douglas-fir trees, and in 1948 on a single tree in the Eddy Arboretum of the Institute of Forest Genetics at Placerville, Calif. These trees were all of Pacific coast origin and at the time of pollination were from 21 to 23 years old. The types of pollinations attempted were: selfing, intra-species crossing, and inter-species crossing (with *P. macrocarpa*). Special attention was paid to the following phases of breeding technique: pollen handling, isolating the flowers, pollination, cone protection, and cone collection.

Pollen Handling

Pollen collection presented the first obstacle to applying pine breeding techniques to Pseudotsuga. The pollen-bearing catkins of Pseudotsuga are rather small and delicate as compared with those of most pines. Furthermore, the process of bud development and pollen shedding is different in the two genera. In most pine species the pollen-bearing catkins emerge from their buds from several days to several weeks before normal pollen shedding takes place. In *Pseudotsuga taxifolia* and *P. macrocarpa* bud-opening and pollen shedding are virtually simultaneous. When the attempt was made to treat Pseudotsuga catkin buds like pine catkins, that is, to collect buds and place them in an extractor to open, the buds invariably withered without shedding satisfactory quantities of pollen. The first successful collection of pollen was made by allowing pollen to shed onto sheets of paper from branches brought into the laboratory. As Cumming and Righter (*4*) point out, however, this method is not applicable if many crosses are being attempted simultaneously and rigid control of parentage is required.

The method finally developed is to place twig tips two to three inches long, bearing pollen catkin buds on the under side of the stem as illustrated by Allen (*1*), in a length of viscose sausage casing, both ends of which are closed by double folds and secured with an adhesive tape. The loaded "extractors" are then hung in a warm room (70 to 80° F.) in which the air is kept moving, and since the viscose allows water vapor to pass, the twigs gradually lose moisture. If the collection has not been too early, the catkin buds will open in response to the warm air, and the pollen which sheds immediately is trapped in the smooth, transparent container. Since the yield of pollen per catkin is small compared with that of even the least prolific pines, the pollen is transferred directly to a pollinating syringe.

To date it has not seemed practical to develop a pollen handling technique as rigid as that described for the pines (*4*), although there is no reason why the twigs bearing unopened buds cannot be washed before placing them in the viscose extractors. In any attempt to apply the immersion method to Pseudotsuga, it should be remembered that pollen of this genus is generally heavier than water, whereas most grains of pine pollen will float. This point may be irrelevant since the floating off of contaminant pollen grains is not the only function of the immersion method. Lidforss (*8*) and, more recently, Saarnijoki (*13*) found that wetting and subsequent drying are highly lethal to many angiosperm pollens, and Cumming and Righter (*4*) suggest that contaminant pollen may start to germinate and then die as the extractor dries out. So far, no work has been done on storage and testing of Pseudotsuga pollen, reliance being placed on the use of freshly collected material. The testing techinques described for pines (*4*) should be applicable.

Isolating the Flowers

Allen (*1*) has illustrated and described the features which aid in distinguishing the conelet buds from the vegetative buds of Douglas-fir. These features were found helpful, yet it proved more difficult to recognize conelet buds before they open than is the case with most pine species. One reason for this difficulty is that the opening of Pseudotsuga conelet buds is more sudden and apparently more closely sychronized over a single tree than in Pinus. Another reason is the less obvious differences between conelet and vegetative buds in Pseudotsuga. Careful daily scrutiny of Douglas-fir trees to be used as seed parents is necessary if pollination bags are to be applied to flowering branches before conelet buds have started to open.

The pollination bag used to isolate flowers required adaptation for use with Pseudotsuga. The

flowering twigs of Douglas-fir are quite limber—particularly in some of the coastal races of this species. Therefore, it was believed that the cloth bag described by Cumming and Righter would cause excessive bending and the risk of breakage in high winds. Accordingly, viscose sausage casings, which had been tried on several pine species at the Institute of Forest Genetics in 1946, were used. This material appears to have been used first by Smith and Romberg (*15*) who made up their bags by closing both ends of tubular sections of transparent viscose with cotton. The writer's previous experience with this bag had shown that the terminal cotton plug often became weighted down with rain water which at the same time softened the viscose. As a result, many bags folded over and collapsed about the emerging flowers, injuring them. Following a few trials and suggestions by several members of the institute staff in 1946, we developed a simple, rapidly-prepared bag which reduced this type of loss and had the advantage of being easy to stack compactly.

The material[1] used for this bag was 11 inches long with an inflated diameter of about 3½ inches. The bag is constructed by making a ½-inch fold across one end, doubling this fold (i.e. making a ¼-inch fold in the first fold), and securing the end with four or five stapling machine staples. These bags have the advantages of lightness, complete transparency, and low cost. Materials cost 3 to 4 cents for each bag and more than 100 bags can be made up per man-hour. They are not re-used, so no time is required for cleaning, sealing, and sterilizing. Pollen will sift out of the staple perforations of these bags, but it seems improbable that significant quantities of pollen can enter by this route. This possibility can be eliminated by stapling a small strip of cotton surgical wadding into the folds. Several industrial tapes tested were only partly successful in maintaining a seal under intense sunshine and occasional rain.

When applying bags, one must avoid enclosing catkin buds unless self-pollination is desired. As Allen (*1*) showed, some twigs bear both types of flowers in close proximity, so removal of catkin buds may be required. Needles are removed only at the point of attachment of the bag, where a cotton wrapping is applied. A soft 16-ply cotton cord is used (*4*). This soft cord with a relatively high coefficient of friction is especially necessary when using a smooth bagging material such as viscose. Bagging should not be done too far in advance of flowering as experience in the sunny late-spring weather of Placerville has shown Pseudotsuga to be more susceptible to heat injury within the bags than most species of pines. So far it appears that the year-old foliage is more susceptible to injury than the emerging foliage or developing conelets. If only a few bags are to be placed on a single tree, it is preferable to use the north side of the crown in order to reduce heat injury.

Pollination

Careful studies of conelet receptivity have not yet been made. The long bracts of the Pseudotsuga conelet obscure the behavior of the scales, which cannot be readily detected in the clear-cut position-stages described by Cumming and Righter (*4*) for Pinus and illustrated by Syrach-Larsen (*17*) for Abies. Flowers of Pseudotsuga were considered receptive and were pollinated when they had completely emerged from the bud scales. The results seem to have justified this arbitrary criterion of receptivity.

As has been noted, it is difficult to collect Pseudotsuga pollen in the 100-cc. quantities commonly obtained in pine breeding. Therefore, Douglas-fir breeding requires a more economical method of applying pollen than the 0.5-to-1-cc. injections usually made with pines. To save pollen, the syringe described by Cumming and Righter (*4*) was modified by fitting it with a pollen agitator. The agitator is a fine-guage brass tube slightly shorter than the syringe barrel with a J-shaped bend at one end. The straight end of the this tube is inserted in the syringe bulb, which, in turn, is placed in the syringe barrel in the usual manner. In use, the needle is thrust through the bag at an appropriate place and the syringe is held with the needle end uppermost so that the pollen charge lies clear of the discharge orifice of the syringe barrel. When the bulb is squeezed briskly, a fine jet of air at high speed stirs up the pollen charge and the cloud of pollen so formed is then expelled through the needle and dispersed throughout the bag.[2] After pollination the needle puncture is sealed with a small patch of cellulose tape or plugged with a wisp of cotton.

Pyralin streamer tags (*4*) are satisfactory to mark the pollinated conelets. In 1948 a time- and cost-saving modification[3] was tried successfully. Strips 1 inch wide and 24 inches long are cut from "predoped" aircraft fabric. These are then stamped with a hand numbering machine set to print each number twice. A number is stamped[4] at the end and middle of each strip. Then the numbered end is folded over and stapled down with an office stapler, leaving a loop long enough to allow the tail of the tag to be passed through it. This makes a tag with its distinguishing number protected under a fold. The same distinguishing number is repeated in the middle of the tag so as to be visible even when the tag is tied around a twig. Tying is accomplished by running the free end of the tag through the loop and pulling tight—an operation which is quicker and easier than tying on a wired tag. For security in windy locations the tag should be wrapped a second time around the twig and then pulled through the loop so

[1] Available from either the Transparent Package Company or the Visking Corporation, both of Chicago, Ill.

[2] Dr. J. W. McKay, of Beltsville, Md., has told the writer of a somewhat similar pollen agitator used in pecan pollination.

[3] Based largely on suggestions made by E. F. Kimbrough and E. J. Carpender of the institute staff.

[4] A special weather-resisting ink was compounded by the California Ink Company for this purpose.

formed. After 5 months of exposure, both the exposed and covered numbers on these tags were little faded, and the fabric near the point of attachment was somewhat brittle. This was at the time of cone collection, and no tags had been lost. Similar tags used in the cooler, damper climate of Berkeley, California, were in good condition after 12 months; others have survived 12 months of exposure on trees at 7,000 feet in the Sierra Nevada. Thus these tags are satisfactory for species which require only one season to mature seed. Tests in progress with the pines will reveal the suitability of these tags for species with biennial and triennial cones.

Cone Protection

Since insects which destroy cones and seeds of Pseudotsuga appear to make their attack early in the development of the cones, it is necessary, as well as expedient, to apply cone-protecting bags at the time when the pollination bags are removed. This should be done as soon as the conelets are no longer receptive, to minimize heat injury in the transparent bags. Here again, in the absence of careful studies, an arbitrary criterion has been set up. Within a week or two following conelet emergence, depending on the weather, the rapidly enlarging cones turn downward sharply to assume the deflexed position characteristic of the mature cone. This has been used as an indication that it is safe to replace the pollination bags with small cloth bags. For two years it has been observed that flight of Douglas-fir pollen has ceased by this time.

The suggestion (*4*) that a single bag be used to combine the functions of flower isolation, cone and seed protection, and labeling is particularly attractive for Pseudotsuga. Such a bag would not have to be as large as would be required for the pines; on Douglas-fir it would need accommodate only one year's shoot growth plus a few relatively small cones. It would need, however, a certain degree of transparency, the property of filtering out the longer wave lengths of sunlight, and sufficient porosity and permeability to permit cooling by transpiration and air movement. Also, it would have to be light, fairly durable and inexpensive.

Cone Collection and Seed Extraction

Although the cone protection bags prevent loss of seed if the cones open before collection, it is more efficient to collect cones before they open. If Douglas-fir cones are opened in drying trays the seeds are less likely to become entangled in masses of resin, needle fragments, and cone scales than if seeds are shed into bags along with drops of resin, which exude rather plentifully from the maturing cones.

Results

In both the 1947 and 1948 tests, few cones were lost between pollination and harvest, regardless of whether the cones contained hollow or sound seeds (Table 1). This is not surprising, since Allen (*2*) harvested cones containing large unfilled seeds from branches on which he had prevented pollination.

Several facts emerge from Table 1. First, controlled cross pollinations within the species gave a high yield of sound seed, much higher than uncontrolled wind-pollination. Second, the self-pollinations made on one tree yielded no sound seed and relatively few hollow seeds. Third, the inter-species cross *Pseudotsuga taxifolia* x *macrocarpa* appears, from the meager evidence at hand, to be rather hard to make. Future attempts, using other parent trees may be more successful. The three apparently sound seeds out of a total of 438 large seeds resulting from this cross failed to germinate, so no claim to have accomplished this cross is made.

Data on germination behavior may shed some light on the adequacy of pollination control. Righter (*12*) has shown that lots of seed from a single pine seed tree which differ only in pollen parentage will require different mean times for germination. This behavior has been noted so frequently at the Institute of Forest Genetics that it has become one of the most generally applied criteria for adequacy of pollination control. Eleven germination counts extending from the 12th to the 33rd day after sowing showed the following behavior of two lots of seed collected from *P. taxifolia* No. 43 in 1948:

	Pollen parent	
	P. taxifolia No. 47	Wind
Number of seeds sown	56	36
Percent germination	73	97
Mean time to germinate (days)	21.8	23.8

Germination started on the 16th day and was completed on the 30th. The mean difference of two days in germination time was found to be highly significant at the 1 percent level. This appears to be fairly acceptible evidence that the two lots of seed constitute different populations, and that, therefore, a degree—undertermined, of course—of pollination control was achieved in this case. This conclusion may be tested by further studies of the two lots of seedlings as they develop.

TABLE 1.—RESULTS OF CONTROLLED POLLINATION OF DOUGLAS FIR IN 1947 AND 1948

Pollen parents	Conelets pollinated	Cones collected	Hollow seeds	Sound seeds
	1947. Seed parent *P. taxifolia* No. 38			
	Number	*Number*	*Number*	*Number*
Self	10	6	35	0
P. taxifolia, Webber Creek	17	10		71
Wind (i.e. neighboring arboretum trees)	10	10	432	5
1948. Seed parent *P. taxifolia* No. 48				
P. taxifolia, Webber Creek	9	7		3
P. taxifolia No. 38	2	2	10	0
1948. Seed parent *P. taxifolia* No. 43				
P. taxifolia No. 47	18	15	187	515
P. macrocarpa	35	27	435	3
Wind		28	725	58

Discussion

This small amount of exploratory breeding with Douglas-fir suggests that the techniques worked out for the pines can be readily adapted to Pseudotsuga. It is still too early to claim absolute control of pollination in these experiments. This must await a study of the seedlings produced, a difficult matter in a genus in which species differences are so relatively slight—at least in young plants—as they appear in Pseudotsuga. Nevertheless, the facts that attempted intraspecies cross pollinations gave higher sound seed yields than wind-pollination and that attempted selfing produced no sound seed are in agreement with results with other conifers. Further confidence in the techniques used is inspired by the seed germination data.

Since data on yield of seed from controlled pollinations are not adequate to be representative, detailed cost estimates are not possible. It appears that pollination costs may be lower than with the pines, and certainly no higher. Righter (*11*) has estimated the labor charge for producing controlled-pollinated pine seeds to be from 30 to 45 man-days per 1,000 pollination bags (each of which may enclose 3 to 15 potential cones in the pines, perhaps fewer in Douglas-fir).

Two factors may effect eventual costs of producing pedigreed seed of Douglas-fir: seed production by young trees and self-infertility. Allen (*3*) has shown that Douglas-fir trees as young as 7 years may produce good crops of sound seed. The trees used in the present study were from 21 to 23 years old and, like many of their neighbors of the same age, had been producing cones abundantly for several years. This means that the prospects for securing early crops from plantations of selected mother trees are good. Self-infertility, found by Allen (*2*) and in the present study, suggests the possibility of producing controlled-pollinated seed without bagging on isolated seed trees or on blocks of single clones of seed trees. This could be done either by inter-planting the blocks with selected pollen parents, or, in view of the generally inadequate pollen production by young Douglas-firs, by dusting seed-tree blocks with pollen collected from selected pollen parents. A single self-infertile clone of the intended seed-parent species might also be planted within pollinating range of already established trees of another species.

Douglas-fir is likely to prove as susceptible of improvement through controlled breeding as other forest tree species. How, then, may the forester working with Douglas-fir apply this controlled breeding technique? He may proceed along two general lines, which may be described as selective breeding within local races or hybridization between races and species.

Selective breeding consists of selecting forest trees of outstanding merit in growth rate, form, and other qualities and making crosses between these selected individuals. Lindquist (*9*) describes the standards and methods for selecting "elite" trees of Scotch pine in Sweden. Selective breeding is, at first, largely experimental, for the breeder cannot be certain that his "elite" trees owe their superior qualities to outstandingly good heredity in all cases. Lindquist himself emphasizes this point. Furthermore, even when a number of "elite" trees with outstanding heredity are found and proven by progeny tests, it is not likely that all the possible cross combinations will yield equally good progenies. This has been the experience of corn breeders, who devote much of their effort to developing foundation inbreds that will combine to form outstanding hybrids. The corn breeders find that comparatively few of the possible combinations are successful. Notwithstanding this qualification, selective breeding with an unimproved forest tree species can be expected, from the first, to yield progenies certainly as good as, and very likely much better, than the average stock normally used by the forest planter. Furthermore, the returns from selective breeding are likely to increase with increasing knowledge of the breeding behavior of the parent trees used.

Progeny tests, mentioned above, require further comment. A progeny test is a procedure designed to determine the breeding value of a plant by a study of its offspring. The detailed steps which must be taken, the ease with which a progeny test may be made, and the reliability of the information resulting from such a test depend on two sets of factors. The first of these has to do with the normal method of reproduction of the plant being tested; the second with the mode of inheritance of the character being studied. The simplest case is one in which the plant is normally self-pollinated and the character being studied is qualitative, and clear-cut, such as color or shape. Such a character is often conditioned by one or a small number of genes, and the offspring of a self-pollinated plant can be scored into a few obvious classes on the basis of the appearance or non-appearance of this character. If the offspring are all of the desired type, the parent plant tested is obviously a valuable one.

None of the conifers about which we have any information can be tested so simply. They are all wind-pollinated, and generally self-infertile. As a result, each tree, the descendant of a long line of cross pollinations, is highly heterozygous. A further result is that even if a tree is successfully self-pollinated, or pollinated by a single known pollen parent, the resulting seedlings will form a population heterogeneous in all respects; it will be difficult or impossible to draw valid conclusions as to the breeding value of the parent. If the character tested is quantitative, such as rate of wood production, the situation is further complicated by the fact that, almost without exception, such characters are conditioned by a large number of genes. Thus it is evident that progeny tests of conifers designed to find parents which will transmit high growth rate to their offspring are beset with great theoretical and practical difficulties, which are increased if, as has been the case in

some of these tests, pollination is not controlled. From the foregoing discussion of progeny tests, one may conclude that selective breeding is likely to be successful with a conifer if the end in view is some clear-cut qualitative character, such as the narrow, fine-branched crown sought by Lindquist (*9*), and if prospective parent trees exhibiting the character show up well in controlled progeny tests. There is less reason for optimism as to the success of a selective breeding program designed to increase rate of wood production. The solution to this problem is more likely to be found in mass selection in areas which contain a high proportion of rapid-growing trees, as advocated by Lindquist (*9*), or in hybridization.

The case for hybridization has been presented by Righter (*11*) and by Stockwell and Righter (*16*), who have discussed in detail some of the advantages of pine hybrids and some proposed methods for combining the extensive testing of hybrids with forest production. In view of the fluid state of Pseudotsuga taxonomy—Flous (*6*) describes 11 taxonomic entities within the species *P. taxifolia* to which the more conservative American foresters adhere—it is arbitrary to distinguish between racial and species crossing in this genus. Nevertheless, with *P. taxifolia* and *P. macrocarpa* (to be conservative) in North America and *P. japonica* and *P. sinensis* in East Asia, the scope for inter-species crossing seems much more restricted in Pseudotsuga than among the pines, which number 80 to 90 species.

As far as can be determined from the literature, the Pacific Coast Douglas-fir, as a timber tree, is without a close rival in the genus. Nevertheless, there remains the possibility that species crosses may some day be of tremendous value in introducing disease or insect resistance into Pacific Coast Douglas-fir. Several of our prime timber species are threatened with extinction by disease. In some cases, the species have been found to contain resistant individuals which can be used as foundations for developing resistant strains through selective breeding. However, in at least one case, the chestnut-blight, resistant native individuals have not been found, and the only hope of introducing resistance into our native species is by crossing it with resistant Asiatic species. Furthermore, even granting the possibility of eventually finding native individuals resistant to any given disease or insect, species hybridization may prove a much quicker procedure.

Geographical variation in Douglas-fir has been extensively documented. Within the broad geographical races, smaller groupings, which Isaac (*7*) terms strains, can be recognized by their narrow site preferences and sharp climatic limitations. Munger and Morris (*10*) found that progenies from 2 out of 13 seed source localities within the distribution of the Pacific Coast form of Douglas-fir made outstanding height growth in four widely separated test areas. Thus it seems likely that planting stock combining specific site adaptation and rapid growth can be produced by racial crossing. Von Wettstein and Daubinet (*18*) have reported a promising cross between local races of *Pinus silvestris*.

Summary

A technique for controlling pollination in Pseudotsuga is described as an adaptation of that developed by Cumming and Righter (*4*) for the pines. From the breeder's point of view, Pseudotsuga differs from Pinus most significantly in that it presents more difficulties in bulk pollen collection, and matures seed from 1 to 2 years sooner than the latter genus. Production of apparently normal cones by Douglas-fir depends little on the type of pollination and is no indication of success in producing sound seed. Self-fertility appears to be low, although more individual seed trees should be studied before generalizing for the whole species.

Suggestions for the application of this technique in a program of genetical improvement are sketched.

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Notes and Comments

The Objectives, Procedures, and Status of the National Recreation Policies Committee[1]

In this day of increasing demand for recreational facilities and programs and of trying to get constructive work done through national committees, it is not strange to learn that a National Recreational Policies Committee has been formed, with the sincere hope that it may contribute some productive ideas on how we create and handle our recreational facilities, and what we are doing to our recreational natural resources.

Organization of the National Recreation Policies Committee follows a procedure used in the fields of education, health, safety, mental hygiene, and rehabilitation.

The broad purpose of the committee, implied in its name, is to formulate, in cooperation with existing organizations, and to recommend, guiding policies for recreation. More specifically stated, the objectives are:

1. To prepare, publish, and disseminate, from time to time, statements of proposed policy regarding recreation in the United States, and the international relationships of American recreation.

2. To prepare before March 1 of each year a list of the current major recreational problems, together with the committee's recommendations dealing with these problems. These lists and recommendations shall be communicated without publication to the officers (preferably to the resolutions committees) of the major state, district, national, and federal agencies and associations involved in or concerned with recreation for their information.

Structure and principles of selecting members of the committee were developed by a small group whose efforts grew out of discussions at various annual meetings of the National Recreation Congress. The form of organization follows rather closely that of the well-known Educational Policies Commission.

In the early part of 1949 communications were sent to an approved list of professional organizations requesting each of them to nominate from their membership one person to serve on the proposed committee. Qualifications of this nominee are a bit hard to meet but the two which appear to be most significant are:

1. Does he believe that recreation is a major social concern and an indispensable part of modern living?

2. Will he give the time, thought, and effort required to perform this function (as a member of the committee)?

The Society of American Foresters is one of the professional organizations concerned, and the writer was nominated by its Division of Forest Recreation, and elected to serve for a term of four years. Other terms of elected professional members are two and six years. The total number of such members is not to exceed fourteen, and one-half that many are to be selected as members at large from nominations of groups which are nonprofessional but have broad interest in, and render service to, recreation. The Society of American Foresters has nominated James J. Goulden of the Tennessee Valley Authority for election as member at large, and he is elected to serve a term of two years.

Personnel of Committee

The committee as now constituted is considered to be an independent body rather than a group whose individual members operate only as representatives of the organization which nominated them. It consists of the following members and officers:

Shirley W. Allen, School of Forestry and Conservation, University of Michigan, Ann Arbor, Mich.

Gerald P. Burns, executive director, American Camping Association, Inc., 343 So. Dearborn Street, Chicago 4, Ill.

Charles K. Brightbill, executive secretary, The President's Committee on Religion and Welfare in the Armed Forces, Room 1045, Tempo "R" Building, 4th and Jefferson Drive, S.W., Washington 25, D. C.

Reynold Carlson, associate professor of recreation, School of Education, Indiana University, Bloomington, Ind.

Milo Christiansen, (vice chairman of the committee), D. C. Department of Recreation, 3149 16th Street, N.W., Washington 10, D. C.

James J. Goulden (at large), Tennessee Valley Authority, Knoxville, Tenn.

Ray Johns, general secretary, Central Y.M.C.A., 316 Huntington Avenue, Boston, Mass.

Dorothea Lensch, director of recreation, 115 City Hall, Portland, Ore.

Harold D. Meyer, professor of sociology, University of North Carolina, Chapel Hill, N. C.

Robert Morrison, (secretary-treasurer of the committee), director of health and physical education, National Jewish Welfare Board, 145 East 32 Street, New York 16, N. Y.

G. Ott Romney, (chairman of the committee), dean, School of Physical Education, Health and Recreation, West Virginia University, Morgantown, W. Va.

Walter Roy, superintendent of recreation, Chicago Park District, Chicago, Ill.

Lewis G. Scoggin, park director, Florida Forest and Park Service, Tallahassee, Fla.

Conrad L. Wirth, National Park Service, Department of the Interior, Washington 25, D. C.

Bruce Tom (at large), Rural Extension Service, Ohio State University, Columbus, Ohio.

[1]Presented at a meeting of the Division of Forest Recreation, Society of American Foresters, Seattle, Wash., October 12, 1949.

Willis H. Edmund (at large), Director of Recreation, Goodyear Tire and Rubber Company, Akron, Ohio.

Lester Granger (at large), Urban League, New York, N. Y.

Theresa S. Brungardt, (at large), state director of recreation, Montpelier, Vt.

Theodore P. Bank (at large), president, Athletic Institute, Chicago, Ill.

George Hjelte (at large), general manager, Recreation and Park Department, Los Angeles, Calif.

William Voigt, Jr. (at large), executive director, Izaak Walton League, Chicago, Ill.

Projects for Study and Action

At the New Orleans meeting of the committee on September 13, 1949, Dr. Harold D. Meyer was appointed chairman of a subcommittee on projects for study and action. Reynold Carlson and S. W. Allen are the other members. The work of such a subcommittee is considered of importance because it is hoped that a modest budget may be provided through grants from some of the foundations. These bodies are inclined to finance only well-defined and constructive studies.

It seems to the writer that certain policies in the use of wild lands for recreation have been in force long enough to be studied and perhaps overhauled. For example, what do we know about how well the policy works of allowing recreational improvements to be built on public lands, under permit or lease? Are we yet sure that wilderness areas can survive increasing human use without a minimum of sanitary, stock-enclosure, and shelter development? How thoroughly have we understood the priorities of recreation as a land use? How far toward devising and directing actual programs of forest recreation, should land use agencies go?

The subcommitte is anxious to have the ideas of foresters and other administrators of wildlands. Communications may be addressed to the writer, School of Forestry and Conservation, University of Michigan, Ann Arbor, Mich.

SHIRLEY W. ALLEN.

Wallboards from Wood Waste

According to the recent conference of the Northeastern Wood Utilization Council at Harvard University, the utilization of wood waste for making wallboard and other building materials is only just beginning. Many new methods and equipment and a wide variety of wallboards and related structural parts were discussed at the conference.

Ample supplies of wood waste are available in New England from sawmills and other primary wood-using industries according to Edward S. Sowinski, who reported on his field survey for the Northeastern Wood Utilization Council. Made under a research grant from the Federal Reserve Bank of Boston, this survey cites 39 locations in New England where utilization plants would find at least 20 tons per day of wood waste within 15 miles without depriving existing wood-using industries of the wood waste they require for fuel. More than 350,000 tons of wood waste per year could thus be utilized in New England alone.

Wallboard of the grades already on the market are in good demand according to Joshua A. Nicherson, a dealer in building supplies at Orleans, Mass. Public acceptance of new products based on wood waste will be aided by the continued education of home owners, builders, and architects in the merits and also the limitations of new products.

Hardboards and insulating boards are coming into wide use in Europe, too. A. J. A. Asplund of Sweden, inventor of the Asplund defibrator, was present to report that in Sweden the per capita consumption of wood waste and other fiber composition boards was seven times that in the United States. There are about 15 board plants in Sweden and most of their output is by the wet process. These boards do not appear to have displaced plywood to any great extent but have gone into wallboard, mainly into plaster wall substitutes.

The Xilon process, a semichemical process of pulping wood and other fiber wastes developed in Italy by Azienda Brevetti Industriali, is now available in the United States through the Overland Commercial Corporation, Brooklyn 2, N. Y. According to a paper submitted by Paulo Marpillero, this process utilizes a two percent solution of sulfuric acid in open tanks. The acid hydrolyzes the pentosans in the wood and the softened wood is then neutralized and defibered mechanically without removing the lignin.

The manufacture of resin bonded boards from wood waste was reviewed in a paper submitted by Oswald Wyss, managing director of Interwood Ltd. of Zurich, Switzerland. This paper showed the relation of the properties of fiber boards to their densities. Dr. Wyss points out that softboards with densities of about 0.3, and hardboards, with densities of about 1.0 are well known but boards half hard, densities 0.5-0.6, and three quarters hard, densities 0.7-0.8, are now becoming important in Europe because they resemble wood more closely in working properties.

An example of wood waste utilization for moulded construction materials was demonstrated in the products of Durisol, Inc., 420 Lexington Ave., New York 17, N. Y. displayed and described by John D. Dale of that organization. Durisol consists of chemically mineralized wood shavings bonded with portland cement and moulded under pressure. A wide variety of solid and hollow core tiles, slabs, planks, and other modular units are being manufactured in a series of standard sizes. The moldings can be supplied factory coated with $\frac{1}{4}$ inch of waterproof portland cement. Tongue and groove roof planks for spans up to ten feet for loads of 250 lbs. per sq. ft. are being sold. The product was said to be fire resistant, with good heat and sound insulating values, compartively light in weight, and low in cost.

Sawdust is dry-processed into a hardboard without resins by a process developed by Donald F. Othmer and his associates. Dr. Othmer, who is head of the Department of Chemical Engineering at the Poly-

technic Institute of Brooklyn, described and showed samples of this board which will soon be manufactured in a plant in Europe into floor tiles, wallboard, and outdoor shingles. In this process, a few percent of inexpensive, readily available chemicals costing about $2 to $3 per 1000 sq. ft. of board are dry mixed with sawdust which is then hot pressed. Considerable bark may be present without deleterious effect. The product can be nailed, worked, and finished like wood. It may be laminated with metal foils or plastics directly in the process of manufacture.

Another series of board products from wood waste was demonstrated by Warren C. Smith of the Wonderwood Corporation, 1415 Coast Highway, Corona Del Mar, Calif. The process used originated with a Swiss engineer, Fred Farni. Six plants are now in operation in European countries. The European plants sell the board as Novopan and the American as Wonderwood.

In this process wood waste—chips, scraps, and hog grindings—are all bonded together with resins at a low heat and pressure into panels 4 feet by 8 feet and larger. These can be used rough or faced with veneers or plastics. A wide range of special surface effects based in random arrangements of mixed thin veneer flakes offer interesting furniture and architectural design possibilities.

A symposium on resin bonded wallboards was also a feature of the conference and the lively discussion with Robert S. Aries as moderator delved into many of the problems facing wallboard manufacturers in their choice of wood wastes, resins, and processes.

The use and effect of resins in wood waste boards was reviewed by W. T. Sears of the Monsanto Chemical Company, and some of the features of equipment available for wallboard manufacturers were reviewed by H. D. Thweatt, of the Lake Erie Engineering Company, Buffalo, N. Y.

Other papers submitted were by Gosta Genberg of Svenska Cellulosa AB, Sweden, on wallboards made by the Swedish Cellulose Company and another, by William J. Fishbein, managing director of the British Artificial Resins Company, Ltd., London, England, who was to have described his interesting machine for the continuous manufacture of resin bonded wallboard.

The full text of all the papers and a transcript of the discussion will be published in the Council's bulletin series in January, 1950.

The Northeastern Wood Utilization Council, P. O. Box 1577, New Haven, 6 Conn., was organized in 1942 to promote new uses for wood and wood waste, and has been responsible for a number of commercial developments in the field during the last few years. Its bulletins are read throughout the world. Robert S. Aries is technical director of the Council.

Virginia Pine May Make Rapid Growth in Carolina Mountains

Virginia pine (*Pinus virginiana*) is a rapid-growing species that often forms pure stands on abandoned fields in the Piedmont and Southern Appalachian Mountains. However, there is very little published data on growth and yield. For this reason, the data from a clear-cut, old-field stand on the Biltmore Estate near Asheville, N. C., may be of interest.

Stacked and measured pulpwood from 2 one-tenth-acre plots showed that growth had been one cord per acre per year. Four cords were obtained from each plot, making 40 cords per acre. The stand was about forty years of age as determined from ring counts and recollections of local people at the Biltmore Estate. Each tree contained five to eight sticks of pulpwood. The soil was mapped in 1920 as Cecil fine sandy loam.

Growth of this particular stand was considerably higher than average figures obtained from the Forest Survey. Current annual net increment per acre of Virginia pine type in the mountains of Virginia was 108 board feet in saw-timber stands and 0.29 cords in cordwood stands.[1] In western North Carolina, average annual increment per acre of saw-timber material in the Virginia pine-hardwoods type was 140 board feet in uncut stands and 136 board feet in partly cut stands.[2]

In times past, Virginia pine has been considered a weed species of little value. The Biltmore plots, however, furnish an instance where—growing on good soil—the species produces a profitable pulpwood return.

KEITH W. DORMAN,
Southeastern Forest Experiment Station,
THEODORE H. DAVIS,
Champion Paper and Fibre Company.

A Short Cut for Scaling Aerial Photos

In regard the article, "A Short Cut for Scaling Aerial Photos" by Earl J. Rogers, in the October 1949 issue, we would like to show that this method is elaborate and quite unnecessary.

To begin with, it would be necessary to have elevations marked on your maps. These are not always available. It is always possible to obtain flight height above sea level as this is recorded with the photos. But this information is not necessary to obtain the scale. All we need to know is distance between points which can be located on the photos.

We have available a scale ratio meter for chains. This could be converted to feet or hundreds of feet. It also gives, automatically, the ratio of the scale to 20 chains.

Mr. Rogers states that his method will give 3 to 5 percent accuracy. We believe this would depend entirely upon the scale. A 1:100 ft. photo and a 1:40 chain photo will not give the same precision due to

[1]Craig, Ronald B. Virginia forest resources and industries. U. S. Dept. Agric. Misc. Publ. 681. 64 pp. 1949.

[2]Cruikshank, J. W. Forest resources of the mountain region of North Carolina. Southeastern Forest Experiment Station, Forest Survey Release No. 7. 55 pp. 1941.

the mechanical measuring of the photo. Therefore, we believe that our method would give as much accuracy.

Perhaps Mr. Rogers has much reasoning for his method, but at present we fail to see why so much work should be done to obtain the scale.

ANGUS C. SEED,
CARL LENIHAN,
Canadian International Paper Company.

Author's Rejoinder

Replying to the comments of Messrs. Seed and Lenihan on my article in the October JOURNAL titled "A Short Cut for Scaling Aerial Photos," I have not much to say except this.

We have used aerial photos extensively and have found that the system described by my article greatly simplifies the mechanics of determining photo scales. Of course, we need topographic maps to use it. Without these the scheme falls down.

As pointed out by Seed and Lenihan, all that is needed to determine scale is two control points, but this furnishes scale only for the average elevation of these two points. The question immediately is raised, "What about scale at other elevations where no control points are available?" The use of two control points, therefore, seems to fall down in back country where base maps have few control points.

If all photos are used the labor of scale checking each photo becomes a chore. The scheme I have described requires only 10 photos scale checked and about one hour of time. This certainly is not as laborious as scale checking every photo. Then from approximate elevation we can estimate photo scales by a very simple procedure.

I believe Seed and Lenihan are correct in using two points when a photo or two are all that are used and good control is available, but when masses of photos are used there is need for a short cut.

EARL J. ROGERS,
Northeastern Forest Experiment Station.

Abstract of Master's Thesis

The Influence of Depth of Immersion on End Penetration in Douglas-Fir Heartwood when Cold-Soaked in Pentachlorophenol. By Harold James Raphael. Oregon State College, School of Forestry. 1949.

The purpose of these investigations was to determine the influence of depth of immersion on the end penetration of Douglas-fir heartwood. It was thought that the data obtained might be useful in establishing an incising pattern for Douglas-fir, to be used with a nonpressure preserving process.

The investigations also included the influence of certain growth characteristics, "creep," and the effect of compression wood on end penetration. Coast type Douglas-fir was used exclusively in these experiments. Samples, 12 inches long, were cut from 2 by 2 inch strips of B and better material. The samples were kiln dried to a moisture content of approximately 11.5 percent.

The depth of immersion used in these investigations ranged from 2 feet to 12 feet, inclusive, at 2-foot intervals. Thirty samples, three from each of ten different strips, were treated at each immersion led by cold-soaking in a pentachlorophenol-diesel oil solution.

After a 30-minute soaking period, the samples were drained for two hours. They were then ripped, in such a manner that the radial face was exposed, and then run through a jointer. The penetration pattern was outlined with lumber crayon.

The minimum, maximum, and 50 percent-line end penetration was measured on each sample. The 50 percent-line penetration was determined by drawing a line at right angles to the longitudinal axis of the samples so that the treated area above the line was approximately equal to the treated area below the line.

Depth of immersion.—Considering the 50 percent-line as a criterion of adequate penetration, increasing the depth of immersion up to 10 feet seems justified. Depths greater than 10 feet appear to result in only a slight increase in average end penetration.

The greatest influence of depth of immersion was found to be associated with the bands of summerwood. The maximum penetration of each sample was based solely on long streaks of preservative solution in the vicinity of the summerwood bands.

Growth characteristics.—On the basis of the data obtained, there is a definite indication that Douglas-fir, possessing a low specific gravity, will give very poor penetration results. However, the results indicate that the highest specific gravity will not necessarily give the highest penetration values.

"Creep" study.—Samples measured for penetration were allowed to stand for 60 days. At the end of this time they were run through the jointer and again measured for penetration. The second set of measurements showed very little increase in penetration, indicating that the oil used in these experiments did not "creep" to an appreciable degree.

Compression wood.—One strip was found to contain compression wood over approximately one-half its length. Upon measuring the penetration obtained from this strip, it was found that all samples gave very poor penetration results. It appears, from these results, that the influence of compression wood extends for a considerable distance into the apparently normal wood in the immediate vicinity.

Reviews

Green Glory; the Forests of the World.

By Richard St. Barbe Baker. 253 pp. Illus. A. A. Wyn, Inc., New York. 1949. $3.50.

Green Glory is primarily a description of the forests of the world with some remarks on timber harvesting and forest destruction. Much of the material is drawn from the author's own experiences in tropical Africa and elsewhere. The descriptions are colorful and delightful to read. The author has a passionate interest in trees and their well being. He has righteous dismay at the way men have exploited forests throughout the world.

His book is directed to the layman rather than the professional forester. Even the layman, however, is unlikely to arrive at a clear appreciation of the world forest situation today from reading the book. It deals entirely too much in generalities and too little with specific information on the timber resources, forest industries, and economic potentialities of forests of the several countries.

As a scholarly treatise on world forestry *Green Glory* leaves much to be desired. For instance, its authors makes no mention of the Second World Forestry Congress, or of the several congresses held by professional foresters dealing with major world forestry questions since the last war. Zon and Sparhawks *Forest Resources of the World* is not cited nor is mention made of the Food and Agriculture Organization's Forestry Division or its antecedent organizations. Statistics are presented without giving sources. These appear to bear no relation to those developed by recent studies of the F.A.O. Forestry Division and other experts in world forestry.

Numerous armchair concepts appear: "Tree growth is less dependent on the condition of the surface soil than it is upon the depth of the sub-soil;" and "Trees make their own manure and fertilize themselves." He says, "It was Theodore Roosevelt who made the first move by sending Gifford Pinchot to India to study the question of the Department of Forest." Pinchot visited Russia, China, the Philippines, and Japan on the trip to which Baker refers but did not go to India.

Annual timber requirements of the United States are stated to be 25 billion cubic feet and growth 6 billion cubic feet. The estimates from the Forest Service reappraisal of 1945 show that total annual growth and drain are approximately in balance at 13.4 and 13.7 billion cubic feet.

In speaking of Finland's forest he says that "Aspen, alder and birch, especially the latter, are considered forest weeds." Anyone familiar with the fine birch veneer that comes from Finland and also the spools, bobbins, and many other products manufactured from birch realizes that birch is not considered a forest weed, though small-sized birch may have limited markets.

Among mispelled words are Tharandt, Spanish, *cernecosa*, Cryptomeria, Ahern, and Merrill. Quebracho is referred to as a well-known wood used principally for railroad ties immense quantities of which are exported. Its use for tanning is not mentioned. The International Institute of Agriculture in Rome is referred to as the International Bureau of Agriculture. His chapter dealing with Russian forestry appears to be particularly lacking in critical evaluation.

Green Glory can serve as supplementary reading for students of world forestry though it will prove less valuable for this purpose than such books as *A Naturalist's Guide to the Americas, Plant and Plant Science in Latin America* by Verdoorn, and many others.

Those who seek an impression of the types of forest that are to be found in various sections of the world and something of the impression these forests make on the visitor can read *Green Glory* with profit and satisfaction. The author has sought out large trees throughout the world. He has measured and photographed them. His book is illustrated with over sixty splendid photographs.

The main theme of the book is not forestry, but soil conservation. It is a plea for better management of land. Throughout he stresses the disasters, floods, dust storms, depopulation, and decline of civilization that have followed misuse of land. He emphasizes the importance of integrated forestry and agriculture as a land-use development pattern to be followed in every new country. Much stress is placed on the proper ecological approach to use of land for man's livelihood.

Baker is not a prophet of doom though he unhesitatingly paints in lurid color the mistakes of the past. He feels, however, that man is intelligent enough to apply reasonable restraints on his agricultural and forest practices before it becomes too late. His book takes its place along side of *Deserts on the March*, *Our Plundered Planet*, and *Road to Survival* as a plea, and a strong one, for intelligent management of the soil of the earth. Its influence among the lay public should be favorable.

HARDY L. SHIRLEY,
New York State College of Forestry.

American Heartwood.

By Donald Culross Peattie. 307 pp. Illus. Houghton Mifflin Company, Boston. 1949. $3.50.

American Heartwood, by the well-known journalist, Donald Culross Peattie, is a difficult book to classify or evaluate. It is a series of sketches of assorted events and characters in American history, interspersed with disquisitions, writ-

ten in poetical prose, about the American forests, the uses of wood, the exploitation of our timbered domain, and the U. S. Forest Service.

The author tries to suggest that "men and trees are partners in the American story," that Captain John Smith, Roger Williams, William Penn, Peter Zenger, the common soldiers at Valley Forge, Washington, Jefferson, John Marshall, and Andrew Jackson derived much of their fortitude and strength of character from intimacy with the pervading forests and association with the silent forms of brooding trees.

To this reviewer it seems that as an interpretation of American history is not particularly new. Its chief merit is an attempt to describe what the American forest landscape looked like at various times in our history—in the days of Columbus, who was bewildered by the tree species he encountered and regretted that he could not identify most of them; of Cabeza de Vaca who wandered through a trackless wilderness in the south and managed to survive and describe it with an eye for the varied botanical species; of William Penn, who established a commonwealth named Pennsylvania (Penn's Woods); and later days.

There is a wonderful chapter on the role which the forest and the trees played in pioneer life, in providing materials for shelter, tools, furniture, textiles, medicines, and even food. The last chapter is an impressionistic and laudatory sketch of the U. S. Forest Service and its personnel.

ANTHONY NETBOY.

Timber Stand Improvement in the Southern Appalachian Region.

By George M. Jemison and George H. Hepting. 80 pp. Illus. U. S. Dept. Agric. Misc. Pub. 693. 1949.

Among the substantial contributions made by the C.C.C. to American forestry was the opportunity it afforded to test some of our silvicultural theories. Foresters were pretty well agreed that one of the urgent needs, in the older parts of the country at least, was to rebuild forest values in depleted forests, but there was less agreement on how that could best be accomplished. With the coming of C.C.C., for the first time foresters had at their disposal the means of putting their theories to the test on what might be called a pilot plant scale.

Jemison and Hepting, by bringing together a keen analysis of the results of these test operations and supplementing them with research findings of the Southeastern and other experiment stations, have put into the hands of foresters of the Southern Appalachian region the first comprehensive guide to timber stand improvement work.

In their treatment the region is first subdivided into five physiographic provinces in which soil, topography, and climate produce forest types and growing conditions that are fairly uniform. Although the material presented is based primarily on studies in the mountain areas, (because here are the public forests), it is stated that it is applicable to the valley and plateau areas with the exceptions noted in the text.

Discussion of costs is held to a minimum because timber stand improvement work is seldom done as such. In practice it must be less a matter of doing something called improvement than of how the forest manager does those routine jobs which must be done if the forest is to be managed at all.

For purposes of discussion, four broad forest types are recognized: the hardwood forest, the pine-hardwood forest, the pine forest, and the spruce-fir forest. Each type is then made the unit in setting up recommended practices. Considerable space is devoted to the more common diseases and their place in determining cutting practices, particularly in regard to holding them to a minimum in the on-coming forest.

Because TSI work often involves a certain amount of planting, a brief section is devoted to the care of plantations, with special reference to their protection from diseases and insects peculiar to trees growing in plantations.

The text is copiously referenced, with fifty-three specific and five general references. An appendix lists the S.A.F. forest cover types included under each of the four broad types recognized in the report, trees of commercial importance and their requirements, and the more important tree and insect enemies.

The reviewer would like to have seen more space given to the menace of honeysuckle and is inclined to believe that the roll of the locust leaf miner is underrated. He also finds difficulty in reconciling the statement that "Ammate seems to be most effective . . . when applied in the late summer and early fall" with Peevy and Campbell's report in the June 1949 issue of the JOURNAL. True, the former refers specifically to killing trees while the latter is speaking of the control of sprouting. Or is it a question of regions?

It is a useful and well arranged publication, and it is hoped that something comparable for other cutover regions may follow.

WILBUR O'BYRNE,
Virginia Polytechnic Institute.

Paul Tiber, Forester.

By Maria Gleit. 209 pp. Charles Scribner's Sons, New York. 1949. $2.50.

The determination of a young man to achieve a career in forestry is the theme of this story about Paul Tiber, the son of a miner, in a Pennsylvania coal town. Paul spends his spare time in the woods making maps, studying species of trees, and observing wildlife.

One of his ambitions is to change the ugly drabness of Ashburn, surrounded by slag piles and ash heaps, to a pleasant town where people would be proud to live. He hoped to do this by removing the piles of coal waste and planting trees. Then he planned to encourage people to make gardens and

improve the appearance of their property. But the task he had undertaken was to be won only by hard work. The family needed money so Paul, then seventeen, started working in the coalbreaker. His father had said that no son of his would work in the mine, but he tried to believe as Paul did that it would only be for a short time.

Working all day and trying to study at night was too slow, so with the money he had saved Paul decided that his younger brother Dave, who was also interested in forestry, would apply to enter the state university and get his degree. He could then help Paul with his plans.

The seasons drifted by, and while Paul, now twenty, was in the mine, Dave was studying at the university. Paul secured a job as fire fighter with the state. He was free from the mine for a time, but at the end of the fire season he returned. The next year he became assistant to the fire boss, and still hoped he could quit the mine soon.

Eventually he induced the coal company to undertake a tree planting program on its burned-over and cut-over lands. At the same time the town in which he lived started to beautify the streets and homes by planting trees and shrubbery, following his example. He became forest manager for the company, and his brother graduated from forestry school and became a government forester.

This story is all the more interesting because it is a true account of a young man's success as a self-taught forest conservationist.

ALBERT CLEPPER.

Holztechnologisches Handbuch (Handbook on Wood Technology).

By Dr. Leopold Vorreiter. 548 pp. Illus. George Fromme & Co., Vienna, Austria. 1949. $14.80.

This book was written to fill the need for a comprehensive, up-to-date, and at the same time practical handbook on wood technology. The material is well organized and the difficult printing job is exceedingly well done. Although throughout the book emphasis is put on a solid mathematical foundation, technical facts are made easily understandable by the liberal use of 209 drawings and photographs. Statistical data are assembled in 159 tables. A special feature is a large fold-in-table which contains essential physical data on 47 coniferous trees and 148 hardwoods, including many species of the tropics and of the southern hemisphere.

The book is divided into the following chapters: *A*. General; *B*. Terminology of forestry and wood industry, statistics and units of measures; *C*. Anatomic structure of wood; *D*. The appearance and superficial characters of wood; *E*. Wood physics; *F*. Strength characteristics of various woods; *G*. Chemical composition and character of various woods; *H*. The durability of wood, and wood destroying agencies; *I*. Protection of wood; *J*. Improved woods.

The present volume forms part of a series. In Vol. II and III the following subjects are to be dealt with: tools and equipment, woodworking machines and procedures for all branches of the wood industry; technique, organization and economics of wood industry; economics of wood waste and wood utilization; principals and methods of research in wood biology and wood technology; methods, instructions, machinery and tools for wood testing.

R. STAHELIN,
U. S. Forest Service.

Logging Farm Forest Crops in the Northeast.

By Fred C. Simmons. 60 pp. Illus. U. S. Dept. Agric. Farmers' Bul. 2008. Supt. Documents, Washington 25, D. C. 1949. 20 cents.

A compilation of the material scattered throughout numerous publications on use and care of various tools and on timber harvesting techniques is supplemented by the author's wide experience in logging practices in the Northeast. Numerous pictures and sketches help explain the text.

Written primarily for farmers and woodlot owners, this bulletin could well be on every forester's bookshelf. Too few foresters have had actual training in hanging an ax or in sawfiling, in spite of the well-known Si Lawson's famous, unexpurgated classes in sawfiling at Michigan, Syracuse, and other forestry camps.

Chapters are devoted to choice and use of logging equipment; farm equipment useful for logging; special logging equipment; lay-out of the logging job; woods operations; log loading; and hauling. Details on hanging and sharpening an ax (simplified spelling), sharpening hand saws, selecting and using power saws, wedges, peavies, cant-hooks, pulp hooks, and peeling tools are supplied with many tips to the earnest woodsmen. Full-scale drawings of gauges to test taper in ax blades are furnished, but a 2½ pound ax seems a bit on the light side for the thin model. Sharpening techniques and safety measures are played up.

Some forest management is mentioned in selection cutting but no recognition is given to approved practices in clearcutting in spruce-fir stands and in acidwood operations, especially in job lay-out plans. No mention appears of Koroleff's cable skidding by gravity on steep-slopes, a technique more farmers would appreciate than the logging sulky pictured. Why show such a ponderous, expensive piece of equipment, admittedly used mostly by logging contractors? Especially when the author comments "two-man chain saws are generally heavier and bigger than necessary for cutting timber on the farm woodlot. . . ."

The inclusion of a sketch showing all the different parts of a skidding harness might help a few amateur loggers, but few real farmers. Perhaps it was meant for the foresters who will read and use the bulletin. The picture of a commercial 6 by 6 truck, with power on all six wheels is a far cry from the usual log and pulp trucks, mostly Ford 1½-ton jobs with "booster" axles made of an extra rear-end and springs salvaged from a junk

yard to carry 4 to 6 standard cords of wood or 2 to 2½ M of hardwood logs. The expensive, heavy-duty truck is operated by few farm woodlot owners.

In trying to cover a wide field, Simmons has done a good job on the material presented. Any forester who has observed his regional or state logging shows realizes that he knows his stuff. More bulletins should be written in the same simple language, set in readable type. It was good to read a government bulletin without a single scientific name in italics! The artist who drew the sketches ought to go out with Fred sometime as one sketch on bunching logs shows a chain apparently with three ends; another sketch probably meant to show a binder-pole, but there is no mention of it in the labels.

To be critical, there might have been included the following information: suggestions on holding the bow to insert a new bow-saw blade; laying double-bitted ax flat on the ground as a safety measure; tripod-with-cable and trolley and counterweight for two-man power saw in bucking tree-length logs or pulpwood; a power splitting machine for fuel wood and fence posts (which are not mentioned as a woodlot product, but several million are cut each year in Northeast); a combined wood-saw and power-loader (wood-mill); and some emphasis that log cutters should obtain specifications before cutting lengths. Obviously, if veneer and handle-stock logs are to be cut in odd lengths then the standard 2-foot change in log lengths will not obtain.

No mention was made of labor to be used in woodlot operations. Labor and compensation laws in various states vary widely, and applications of these laws may depend upon usual "hired-man" category or use of day labor. Also, an obvious explanation for the author's somewhat bitter comments on lump sum sales and consequent poor forest management might be found in the wide spread of the dairy industry in the Northeast which keeps many farmers tied to chores and dung fork, with little time to spend in the woods, hence increasing use of kerosene, coal, and canned gas for heating and utilities.

A handy, useful reference bulletin.

JAMES D. POND,
Consulting Forester, Ithaca, N. Y.

Lumber Dry Kilns and Their Operation.

By A. J. Panshin. 70 pp. Illus. Special Bul. 359. Michigan State College Agric. Expt. Sta., East Lansing, Mich. 1949.

In this bulletin the author endeavors to cover a large field and is compelled to condense the material and leave out a great deal of detail.

The first several pages are devoted to reasons for seasoning and kiln drying of wood, and contain formulae and examples of how to measure moisture content. Following this part is a quick resume of the drying factors of heat, humidity, and circulation explaining and illustrating the several ways of obtaining heat in old as well as modern kilns. A method of determining heat requirements by formula is explained and exampled.

The various methods of obtaining circulation from gravity air movements to internal and external fans are described. A table for obtaining relative humidity percent and equilibrium moisture content of wood under various conditions is included. This is a useful table but is presented in very small type.

Various types of modern kilns are shown in section drawings and by isometric views with a brief description of each group.

Instructions for piling lumber for kiln drying are discussed with some illustrations and later on in the bulletin is shown the final tests for moisture determination and case hardening. Defects in kiln drying such as checking, warping, and collapse are discussed.

Some detail is shown of kiln building construction for walls and roofs that are commonly used in the construction of dry kilns.

Modern automatic control instruments are well illustrated and the need for control is stressed. Towards the end of the bulletin, dry kiln operation is emphasized by including Forest Products Laboratory drying schedules, explaining the use of sample boards in kiln operation and the important tests required at the end of a drying period. Defects that frequently affect kiln drying are briefly described but no illustrations are used.

The publication is well written and is easy to read, and contains both a table of contents and an index.

For those who want a highly condensed treatise of the subject, it should prove valuable and interesting reading.

HIRAM L. HENDERSON,
New York State College of Forestry.

Current Literature

Compiled by MARTHA MEELIG, *Librarian*
The New York State College of Forestry
Range Management Section Compiled by
FRANCES FLICK, *Library, U. S. Department of Agriculture*

General

American Heartwood. By D. C. Peattie. Houghton Mifflin Co., New York 16. 1949. $3.50.

Bernhard Eduard Fernow: A story of North American Forestry. By A. D. Rodgers, III. 750 pp. Illus. Princeton Univ. Press, Princeton, N. J. Winter, 1949-50.

The California Pine Region Forest Handbook. By C. A. Craig and W. P. Maguire. 193 pp. Illus. Calif. State Board of Forestry, Sacramento. 1949. 50 cents plus 3% sales tax (Printing Div. 11th & O Sts.)

Right of Way Maintenance By Plant Community Management. By F. E. Egler. 19 pp. Illus. Conn. Tree Protective Assoc. 764 Waterville St., Waterbury 84. 30 cents.

A Sand County Almanac. By Aldo Leopold. Illus. Oxford Univ. Press, New York 11. 1949. $3.50.

Selected Bibliography of Canadian Forest Literature 1917-1946. By W. M. Robertson. 332 pp. in 3 pts. Dominion Forest Serv., Ottawa. 1949. Misc. Silv. Research Note No. 6. Mimeog.

The Story of Maps. By L. A. Brown. 397 pp. Illus. Little, Brown Co., Boston. 1949. $7.50.

Conservation

A Conservation Handbook. By S. H. Ordway, Jr. 76 pp. Conservation Foundation, 30 E. 40th St., New York 16. 1949. $1.

Farm Forestry

Home Grown Lumber for Farm Buildings. By F. E. Winch, Jr. 24 pp. Illus. New York State College of Agriculture, Ithaca. 1948. Cornell Ext. Bul. No. 747.

How Money Grows on Trees: The Story of the Crop that Grows Eighty Feet High. By General Comics, Inc. 16 pp. Internat. Paper Co., Mobile, Ala. 1949.

Logging Farm Forest Crops in the Northeast. By F. C. Simmons. 37 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1949. Farmers' Bul. No. 2008. 20 cents (Govt. Print. Off.)

Marketing Farm Timber in Monroe County, Georgia. By A. S. Todd, Jr. and J. J. Zirkle, Jr. 33 pp. Southeastern Forest Expt. Sta., Asheville, N. C. 1949. Station Paper No. 3.

Markets for Forest Products in Southeast Georgia. By J. J. Zirkle, Jr. and A. S. Todd, Jr. 110 pp. Southeastern Forest Expt. Sta., Asheville, N. C. 1949. Station Paper No. 4.

Planting the Farmstead Shelter Belt. By Parker Anderson. 16 pp. Illus. Univ. of Minnesota and U. S. Dept. of Agric., St. Paul 1. rev. 1949. Ext. Bul. No. 196.

Timber Crops for Southern Farmers. By R. R. Reynolds. 6 pp. U. S. Forest Serv., Washington 25, D. C. 1949. Obtainable from District Foresters.

Forest Economics

The Place of Forestry in the Economic Development of the Park Falls Area, Wisconsin. By H. W. Mayne. 24 pp. Lake States Forest Expt. Sta., St. Paul 1, Minn. 1949. Station Paper No. 19. Mimeog.

A Report to the People of the South for the Year 1948. 8 pp. International Paper Co., Mobile, Ala. 1949.

Forest Management

How to Grade Hardwood Sawlogs. By A. M. Herrick. 7 pp. Illus. Purdue Univ. Agric. Ext. Serv., Lafayette, Ind. 1949. Ext. Bul. No. 346.

Quelques Problems Concernant les Tables de Production des Peuplements de Pin. By Bolesaw Szymkiewicz. 67 pp. Institut Badawczy Lesnictwa, Warsaw. 1948. Ser. A., Nr. 54. Text in Polish, summary in French.

Thinning Young Oak Stands for Small Mine Timbers—at a Profit. By S. M. Filip. 13 pp. Illus. Northeastern Forest Expt. Sta., Upper Darby, Pa. 1949. Station Paper No. 28.

Forest Resources

Our South: It's Resources and Their Use. By E. E. Evans and R. L. Donahue. 406 pp. Illus. The Steck Co., Austin, Tex. 1949. Text ed. $2.80; Trade ed. $3.50.

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Decay Resistance of Black Locust Heartwood. By T. C. Scheffer and Henry Hopp. 37 pp. U. S. Dept. of Agric., Washington 25, D. C. 1949. 15 cents (Govt. Print. Off.)

The Dutch Elm Disease and Its Carrier. By W. J. Henderson. 11 pp. Illus. Colo. A. & M. College. 1948. Cir. No. 155-A.

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Deer-Livestock Forage Studies on the Interstate Winter Deer Range in California. By W. P. Dasmann. Jour. of Range Mgt., Baltimore 2, Md. Vol. 2, pp. 206-212. Illus. October 1949.

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Manchar Smooth Brome. By R. H. Stark and K. H. Klages. 6 pp. Illus. Idaho Agric. Expt. Sta., Moscow. Bul. No. 275. April 1949.

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Ranchers Have a Stake in Range Research. By W. Keller. Farm and Home Science, Logan, Utah. Vol. 10, No. 3, pp. 6-7. Illus. September 1949.

Range Reseeding by Airplane Compared with Standard Ground Methods. By G. Stewart. Agronomy Jour., Madison 5, Wis. Vol. 41, pp. 283-288. July 1949.

Range Reseeding in Texas and Oklahoma. By W. M. Nixon. Jour. of Range Mgt. Same. pp. 213-217.

Range Tenure on the Northern Plains. By D. Fulton. Same. pp. 187-192.

Reseeding after Klamath Weed. By A. H. Murphy and C. B. Huffaker. Calif. Agric., Berkeley. Vol. 3, No. 7, p. 3. July, 1949.

Results of Studies of Crested Wheatgrass. By W. A. Hubbard. Scientific Agric., Ottawa, Canada. Vol. 29, pp. 385-395. Illus. August 1949.

Some of the Factors to Consider in the Purchase or Rental of Land as it Applies to Range Management. By W. F. Dolling. Wyoming Range Mgt., Laramie. No. 14. 4 pp. August 1949. Mimeog.

Silvics and Silviculture

The Dwight Cofrequency Principle in Diameter Growth Analysis. By L. A. Smithers. 25 pp. Dominion Forest Serv., Ottawa. 1949. Silv. Research Note No. 91.

Loblolly Pine Seed Trees: Selection, Fruitfulness and Mortality. By K. B. Pomeroy. 17 pp. Illus. Southeastern Forest Expt. Sta., Asheville, N. C. 1949. Station Paper No. 5.

Reproduction of White Spruce in a Mixedwood Stand Following Mechanical Disturbance of the Forest Floor. By D. I. Crossley. Dominion Forest Serv., Ottawa. 1949. Silv. Research Note No. 90.

Timber Stand Improvement in the Southern Appalachian Region. By G. M. Jemison and G. H. Hepting. 80 pp. Illus. U. S. Dept. of Agric., Washington 25, D. C. 1949. Misc. Publ. No. 693. 25 cents (Govt. Print. Off.)

Wood Technology and Utilization

The Kiln Drying of Forest Products. Proceedings of the Fourth Annual Northwest Wood Products Clinic, Spokane, Wash. April 12 and 13, 1949. P. O. Box No. 684.

Lumber Dry Kilns and Their Operation. By A. J. Panshin. 70 pp. Illus. Mich. Agric. Expt. Sta., East Lansing. 1949.

Mechanical Properties of Wood. By F. F. Wangaard. John Wiley & Sons, New York 16. About Feb., 1950. About $6.

Trees; or Small Woodware Through the Ages. By E. H. Pinto. B. T. Batsford, Ltd., London. 1949. 25s. net.

Utilization in Manufacture: Pacific Logging Congress 39th Session Trip to Swede Gang Mill; Appraisal of a Douglas Fir Relogging Operation. 24 pp. Dwyer Lumber Co., Portland, Ore. 1949.

Society Affairs

Officers and Members of the Council—1950-1951

CHARLES F. EVANS, *President*
U. S. Forest Service,
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Brown Company,
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Dead River Company,
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DEWITT NELSON,
Division of Forestry,
Department of Natural Resources,
Sacramento 14, Calif.

STANLEY G. FONTANNA,
State Department of Conservation,
Lansing 13, Mich.

GORDON D. MARCKWORTH,
College of Forestry,
University of Washington,
Seattle 4, Wash.

EARL PORTER,
Southern Kraft Division,
International Paper Company,
Mobile 9, Ala.

S.A.F. Members Honored by Election to the Grade of Fellow

"Fellows," according to the Constitution, "shall be foresters of outstanding achievement as leaders in responsible directive or distinctive individual work of a fruitful character."

The election of Fellows is held concurrently with the election of officers. The electors are the present Fellows plus the members of the Council. (A Council member who is also a Fellow has but one vote.)

For the election of December 10, 1949, there were 48 living Fellows who, together with the 9 members of the Council who were not Fellows, comprised an electorate of 57. An affirmative vote of not less than one-half the total number of votes was necessary to elect.

Of 30 Members nominated to the grade of Fellow, the following were elected:

Frederick S. Baker, dean of the School of Forestry, University of California, Berkeley.

Frederick H. Brundage, chief forester, Harbor Plywood Corporation, Portland, Ore.

Henry E. Clepper, executive secretary of the Society of American Foresters, Washington, D. C.

Charles F. Evans, assistant regional forester, U. S. Forest Service, Atlanta, Ga.

John A. Ferguson, formerly head, Department of Forestry, Pennsylvania State College, State College, Pa.

Carl P. Hartley, forest pathologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

Evan W. Kelley, formerly regional forester, U. S. Forest Service, Missoula, Mont.

Royal S. Kellogg, secretary-treasurer, Newsprint Service Bureau, New York, N. Y.

Edward N. Munns, chief, Division of Forest Influences Research, U. S. Forest Service, Washington, D. C.

Ellwood Wilson, consulting forester, Knowlton, P. Q., Canada.

Edwin A. Ziegler, professor of forest economics and finance, School of Forestry, University of Florida, Gainesville.

Bylaw 21 Repealed

Section 4 of Article IV of the Constitution was amended by vote of the membership on November 12, 1948, and now reads as follows:

> Election to the grade of Fellow shall be concurrent with the election of officers by letter ballot of the members of the Council and Fellows. The ballots may be counted by any system of preferential voting which the Council may prescribe provided each candidate elected thereunder shall be required to receive an affirmative vote of not less than one-half the total votes cast.

The preferential system of voting previously used was described in Bylaw 21 as follows:

> The election of Fellows shall be in accordance with the Bucklin system of preferential voting. The ballot form of this system provides for the voters expressing three different sets of choices each in a separate column headed, respectively, First Choice, Second Choice, and Third Choice.
>
> In voting, the voter may mark a cross in the first column beside the names of as many candidates as the quota set by the Council, and he may do the same also in the second and third columns provided that a second cross against the name of any candidate will not be recognized as valid.
>
> In counting the votes, the tellers shall declare elected any candidates whose votes in the First Choice column equals one-half or more of the total number of eligible voters, unless the quota set to be elected would thereby be exceeded; in which case those with the highest total votes will be successively declared elected until the quota is filled. If less than the quota results, the votes in the Second Choice column will be added to those in the first. Any additional candidates who then have the required majority, in terms of total eligible voters, will qualify and those with the highest First Choice votes, in their qualifying totals, will be successively declared elected until the quota is filled. If the quota still remains unfilled, the votes in the Third Choice column may be similarly added in order to give additional candidates a qualifying vote and those with the highest First Choice vote, or in case of a tie, then, the highest first and second choice total, will be successively declared elected until the quota is filled. The election will then be declared concluded even though the quota still remains unfilled.

Since the Constitution was amended to do away with the quota system, Bylaw 21 became obsolete. In short, there is now no limit on the number of Fellow candidates who may be elected, so long as each

successful candidate receives "not less than one-half the total votes cast."

Accordingly, the Council entirely repealed Bylaw 21 in October 1949. In the recent election of Fellows a conventional form of ballot was used with the candidates listed alphabetically, and the electors simply marked a cross opposite the name of each candidate they wished to vote for.

Additional Results of Balloting in Recent S.A.F. Election

At the regular biennial election of officers and Council, held by mail ballot of the membership on December 10, 1949, the following additional decisions were expressed by the voting membership of the Society.

Constitution Amended

Article VII, Section 3 of the Constitution was amended to read as follows (the amended portion being in italics):

The Council shall control the funds of the Society; shall appoint the Editor in Chief of the JOURNAL; shall have the power to fill any vacancies occurring in its number; and shall perform such other duties as prescribed in the several articles and sections of the Constitution. The Council shall receive and act upon charges preferred against any member of the Society, as provided in Article IV, Section 5. The Council shall have power, by vote of at least eight of its members, to draft and establish bylaws but no such bylaws shall abrogate or be inconsistent with any part of this Constitution. *Any action of the Council may be brought before the Society at large on written petition of not less than 250 voting members representing at least three different Sections with at least 25 members from each.* This provision shall not apply to jurisdiction over cases of disciplinary action nor to administrative matters, including the appointment or dismissal of the Executive Secretary, in which cases the decision of the Council shall be final. Six members of the Council shall constitute a quorum.

The vote on this amendment was 2797 *approved;* 622 disapproved. Having received the required approval by two-thirds vote of the members voting, it became effective immediately upon adoption.

Referendum on Membership

The referendum on whether the professional base for S.A.F. membership (Junior Member grade) should be liberalized failed of receiving the necessary two-thirds affirmative vote required to amend the Constitution. Consequently, Article III, Section 4 remains unchanged.

On the question "Shall the present, professional base for membership be liberalized?" the vote was 1506 *yes*, and 2036 *no*.

In case a two-thirds majority of the votes cast had favored changing the membership qualifications, voters were asked to check their preference between the following two propositions.

1. Shall Junior Membership be open to men of professional training, equivalent to that required in forestry, in any form of wild land management, such as range, wildlife, recreation, water and soil, without distinction as to cover types, who have had:

(a) Either professional training in forestry equivalent to 25 percent of that required of an accredited school of forestry?

(b) Or three years' experience in any form of wild land management, together with a demonstrated interest in forestry?

2. Shall membership be open to men without training or experience in forestry, but with equivalent professional training or experience in any form of wild land maangement, range, wildlife, recreation, water and soil, without distinction as to cover types?

The number of ballots cast for proposition 1 was 2424; the number cast for proposition 2 was 735.

Tellers

The tellers who served for the election of officers and Council, and who verified the count of ballots for the amendment of the Constitution, the referendum on membership, and the election of Fellows, were as follows:

Jesse H. Buell,
Arnold T. Drooz,
Gordon D. Fox,
Nelson Fritz,
Robert C. Heller,
Charles D. Mattison,
William A. Peterson,
Bernard Frank, *Chairman*.

The Right of Appeal by Petition

The following item is reprinted from the report of the June 1949 meeting of the Council in the August 1949 issue of the JOURNAL OF FORESTRY, page 680.

"In view of the two conflicting petitions submitted to the Council with respect to the O. & C. controversy, it is evident that Bylaw 54 does not provide appropriate means for handling opposing appeals to the Council. It was the consensus of the Council that the third paragraph of Bylaw 54 has been proved inoperative. It now reads as follows:

"Appeal against actions or positions taken by the Council shall not operate as an injunction against said action in matters of immediate importance as affecting public or other measures in which delay might cause the Society and profession to suffer damage, and in which the Council has reasonable grounds for believing that it represents the majority opinion of the members, or on which the Society has previously determined its position. The right of appeal by petition of a small group shall not thus operate to thwart the purposes of the Society as interpreted by the elected Council, but shall serve, in absence of voluntary submission of a referendum by the Council, to bring about a determination, after proper discussion and deliberation by the membership, of any action of the Council as defined in Article VII, Sec. 3.

"In order that the Council shall have clearcut responsibility with respect to petitions and appeals, the following amended third paragraph of Bylaw 54, on motion of Col. Greeley, seconded by Dean Dunn, was approved and ordered to be submitted to the full Council membership for adoption or rejection.

"The right of appeal by petition, as provided and limited in Article VII, Sec. 3, shall lie against any action or position taken by the Council; provided that in the case of conflicting petitions or petitions opposing a referendum previously initiated by the Council but not yet completed, the Council shall determine the course deemed best for the orderly and effective management of Society affairs."

The proposed amendment to Bylaw 54, printed in bold face type above, was approved by a majority of the Council as of late August 1949. Announcement of this action was deferred until the Council meeting in October at which time the exact wording of the amendment was again reviewed. It was unanimously approved by the Council, as of October 10, 1949.

Because of the illness of the executive secretary as of that date, publication of the bylaw's adoption did not appear in the December 1949 number of the JOURNAL, the issue in which it should have appeared. He regrets the delay.

Report on Conference on Accrediting Called by American Council on Education

The American Council on Education sponsored a Conference on Accrediting at the Mayflower Hotel, Washington, D. C., on November 15 and 16. Representing the Society of American Foresters at this conference were Henry Clepper, executive secretary, and Myron Krueger, chairman of the S.A.F. Committee on Accrediting.

About 75 representatives of 27 national accrediting organizations, six regional accrediting associations, and five educational bodies were present. Sixteen professional societies participated.

The executives of institutions of higher learning in the United States have been concerned for many years with the large number of accrediting agencies which are, in the openion of the executives, usurping their administrative functions. As a result increasing opposition to accrediting has developed throughout the last decade. Most of the opposition centers in the Joint Committee on Accrediting representing the Association of Land Grant Colleges and Universities, the National Association of State Universities, the Association of American Universities, the Association of Urban Universities, and the Association of American Colleges. The vigorous head of this Joint Committee is Chancellor R. G. Gustavson of the University of Nebraska.

The topics listed in the agenda for the conference covered such items as: "Recent steps toward coordination and improvement of accrediting procedures" for which there were four listed speakers and four or five others spoke informally; "Report on plans for the National Commission on Accrediting Procedures," presented by Chancellor Gustavson; "Report on the National Committee of Regional Accrediting Agencies" by President Charles E. Friley of Iowa State College; and "Problems in the field of accreditation demanding further investigation" for which there were seven listed speakers.

In an exchange of correspondence with Dr. Gustavson, Clyde Martin, president of our Society, admitted that reform in the field of accrediting is needed and proposed a meeting between the heads of a few representative institutions and a small number of representatives of the agencies engaged in accrediting professional curricula to bring about needed improvement. It was hoped that this conference would be that sort of a meeting. The very nature of the agenda seemed to preclude any attempt to arrive at conclusions and procedures and therefore prompted the letter, immediately following, to the vice president of the American Council on Education.

Dear Dr. Brumbaugh:

Many thanks for sending me a copy of the agenda proposed for the Conference on Accreditation on November 15 and 16, 1949. Frankly, after reading the agenda, I am somewhat concerned about the effectiveness of the conference. It looks as though we are going to plow and harrow ground that was already well plowed and harrowed in the conferences of 1939 and 1941.

As has been pointed out by Clyde Martin, president of the Society of American Foresters, in his correspondence with Chancellor Gustavson of the Joint Committee on Accrediting, there is a crying need for reform in accrediting, and particularly in the field of professional curricula. Undoubtedly much of the confusion and irregularity existing among the agencies charged with accrediting professional curricula can be removed if representatives of the professional societies will get together and study the situation. I have hoped that the conference in Washington would provide this opportunity. I am very much afraid, however, that the greater part of the time will be spent in listening to the delivery of prepared papers. If the conference breaks up with our having listened to such papers and having participated only in the general discussion of them, the same objections on the part of Dr. Gustavson and his committee of ten will prevail after the meeting that prevailed before, because no attempt will have been made directly to arrive at a solution of the basic problems.

At the outset I believe it is necessary to separate the accrediting of professional curricula from the accrediting of general curricula. The latter field has been handled very ably by the regional associations, particularly the North Central. Apparently it is with the accreditation of professional curricula that most of the dissatisfaction exists. Within the area of professional curricula we could perhaps divide into two groups representing somewhat similar professional activities. For example, medicine, dentistry, nursing, etc., could well consider the needs common to all the "health professions."

It would seem to me that at the forthcoming conference, one or two papers presented by men like Chancellor Gustavson could cover adequately the general problems of accrediting confronting educational institutions and the accrediting agencies. By the end of the first day we of the professional accrediting agencies should have developed some pattern of organization for more detailed discussion. The second day of the conference could then be devoted exclusively to the problems of accrediting of professional curricula and their possible solution. Unless we do get down to cases in some such manner, I am somewhat dubious about the effectiveness of the conference in correcting many of the elements of the accrediting situation that I am sure all thinking persons will admit are bad.

MYRON KRUEGER

At the conference able speakers presented strong cases indicating the need for continuing accreditation in the professional fields. Among the best were Dr. N. N. Luxon of Ohio State University speaking for journalism; Dr. James Farquharson of Colorado A & M College speaking for veterinary medicine; Dr. Donald G. Anderson of the American Medical Association, and a Dr. Blaney of the Council on Dental Education.

From Dr. Gustavson's remarks at the conference it could be inferred that the proposal of the Joint Committee on Accrediting might go so far as to hamstring the accrediting agencies. It must be remembered that the Joint Committee is composed predominantly of executives. It is proposed that there be formed a National Commission on Accrediting with thirty members. This National Commission will erect the framework within which accrediting must be conducted by the agencies. The commission, after a study of the conditions, will draw up a statement of principles. Finally, the commission will constitute an appeal board for those institutions which disagree with the findings of any accrediting agency. The commission is to be implemented with a permanent secretary and an annual budget of $30,000.

Even though no immediate results emerged from the conference in clearing up the differences of opinion between the Joint Committee on Accrediting and the agencies accrediting professional curricula, the discussion did establish viewpoints which can form the foundation for eventually compromising the differences.

It could also be deduced from the discussions that the accrediting agencies have made a worthwhile contribution to the advancement of accrediting professional curricula, that the evils and abuses in accrediting have been somewhat exaggerated by the Joint Committee on Accreditation, and that such problems as do exist are not insoluble.

At the close of the conference it was announced that studies will be initiated by the American Council on Education in which the points brought out at the conference will receive attention. These studies will culminate in a statement of principles on accrediting. The agencies interested in accreditation in the professional fields were assured that both in the studies and in the statement of principles, their advice and comment would be sought. So the value of the conference must await the results to be achieved at some time in the future—it is to be hoped, the not too distant future.

MYRON KRUEGER, *Chairman, S.A.F. Committee on Accrediting.*

Coming Events

Appalachian Section

The winter meeting of the Appalachian Section will be January 20 and 21, 1950 at Raleigh, N. C.

Lenthall Wyman, Division of Forestry, North Carolina State College, Raleigh, N. C., is chairman of the Section.

Allegheny Section

The Allegheny Section's annual winter meeting will be held in Philadelphia, February 16 and 17, with headquarters at the Warwick Hotel.

Mr. George R. Moorhead of the New Jersey Department of Conservation and Economic Development, Trenton, New Jersey, is chairman of the Section Meetings Committee.

Southeastern Section

The Southeastern Section will meet on January 27 and 28, 1950, at Montgomery, Ala.

R. Vance Miles, Gulf States Paper Corporation, Tuscaloosa, Ala., is the Sections' chairman.

New England Section

The New England Section will meet at the Hotel Somerset in Boston, Mass., on February 23 and 24, 1950.

Details of the meeting can be obtained from R. S. Monahan, secretary-treasurer, 41 College Street, Hanover, N. H.

O. W. A. A.

The Outdoor Writers Association of America will meet at Moosehead Lake, Greenville, Me., from June 11 to 17, 1950.

North American Wildlife Conference

The 1950 North American Wildlife Conference will be at Fairmont Hotel, San Francisco, Calif., on March 6, 7, and 8.

Puget Sound Section Installs New Officers

Vincent W. Bousquet, branch forester for the Weyerhaeuser Timber Company at Vail, Wash., was installed as chairman of the Puget Sound Section of the Society of American Foresters at a meeting November 4 in Tacoma.

Bousquet will head the Section through the 1949-1950 term. He succeeds William A. Eastman, Jr., consulting forester of Seattle.

"There are approximately 400 professional foresters in the Puget Sound Section," said Bousquet. "They deal in forest management problems from the Columbia River to Point Barrow, Alaska, in their daily work, and find the Society meetings a valuable forum for ideas, problem solutions, and fellowship."

Other officers installed at the dinner meeting were:

Vice chairman for Washington, Donald R. Hopkins, Washington State Division of Forestry, Olympia.

Vice chairman for British Columbia, C. D. Shultz, consulting forester, Vancouver.

Vice chairman for Alaska, Knox Marshall, U. S. Forest Service, Petersburg, Alaska.

Secretary-treasurer, W. A. Tinney, West Coast Lumbermen's Association, Seattle.

Vincent W. Bousquet (right) addresses the Puget Sound Section of the Society of American Foresters in Tacoma after taking over the gavel as chairman of the group on November 4. Donald R. Hopkins, newly installed vice chairman for Washington, is on the left; and W. A. Tinney, the newly installed secretary-treasurer, sits between them.

New committee heads were named by Bousquet as follows:

Program committee, Delbert Taylor, consulting forester, Port Gamble.

Publicity committee, Lloyd Thorpe, advertiser's agent, Seattle.

Membership committee, John Cameron, manager of Manning Seed Company, Roy, Wash.

Policy committee, Ed Heacox, managing forester of Weyerhaeuser Timber Company, Tacoma.

Others are: Editorial committee, John Miles, branch forester for Weyerhaeuser Timber Company, Raymond, Wash.

Special bylaws committee, Charles Cowan, Washington Forest Fire Association, Seattle.

Committee on Education, Don Fraser, Washington State division of forestry, Chehalis.

British Forester Commends Society's Syllabus on Professional Ethics

Copies of the *Syllabus on Professional Ethics as They Relate to the Profession of Forestry*, prepared for the Society by Prof. A. E. Patterson of the University of Georgia, were sent to the heads of all schools of forestry in the United States, Canada, and the United Kingdom.

The syllabus was developed primarily for the use of instructors to teach students of forestry about the code of ethics for the forestry profession adopted by vote of the Society membership in the fall of 1948. However, any member of the Society may obtain a free copy of the syllabus on application to the Society.

American foresters will be interested in the following letter from Prof. E. P. Stebbing of the University of Edinburgh, an eminent British forestry educator who is also an Honorary Member of the Society.

I received your letter of October 10th, 1949, enclosing *A Syllabus on Professional Ethics as They Relate to the Profession of Forestry* which has been prepared for the Society by Professor A. E. Patterson, University of Georgia. I have read this syllabus through with very considerable interest.

I note that you say it is primarily intended for teachers of forestry, but I think myself it could be read with very great advantage by other professional foresters and also by all those who have any connection with the forest at all; whether on the lumbering side or on the planting and improving side; or finally, merely as a member of the public interested in trees and forestry generally from the aesthetic point of view.

The questions for discussion on pages 12 and 13 are of very considerable interest, I have heard some of these often discussed. Especially interesting to me is question 27—"Should a forester criticize public forest policies?". This, of course, can be taken in two ways. Public forest policies may be laid down by the Minister or Government concerned, none of whom has any forestry knowledge. In the past, at least, they have been mainly responsible for existing forest policies. Because although the policy was drafted by the Chief Forester of the country or State, yet by the time it was issued by the Government it had become very different from the original draft.

In my own forest life I have on occasion found it very difficult indeed to refrain from criticizing what are here put as "Public Forest Policies." Though again I may remark that the expression "Public Forest Policies" may be taken to read in more than one context.

Whilst congratulating the author I would once again like to say to him that I think his syllabus or pamphlet should be addressed to the wide public who have no notion of forestry as well as to the professional foresters themselves.

Elections to Membership

Affiliate

Corliss, J. M., Mass.

Associate

Hosmer, W. A., Mass.

Junior

Alvis, R. J., Va.
Bedger, R. C., Pa.
Bell, J. F. L., W. Va.
Bliss, V. F., Ga.
Boelter, A. H., Mich.
Brown, A. W., N. C.
Brown, R. R., Idaho
Burton, R. E., Calif.
Castellani, W. J., N. Y.
Chase, J. M., Calif.
Denny, J. C., Calif.
Froula, J. C., Miss.
Glattfelder, C. F., Pa.
Guillaume, R. B., Mich.
Hodge, J. S., La.
Hollen, D. E., W. Va.
Hollenbeck, G. N., N. Y.
Hunt, F. M., N.C.
Judy, D. T., W. Va.
Kelley, L. K., W. Va.
Kick, L. W., N. Y.
Killmar, K.D., Mich.
Lee, R. E., Minn.
Love, W. B., Mich.
McDonald, D. R., Ark.
Moore, R. C., W. Va.
Owen, A. Z., Fla.
Pfefferle, K. T., Va.
Riley, R. W., Miss.
Roach, B. A., Mich.
Shoulders, E., Ark.
Sims, J. R., Ore.
Stokes, R. A., Fla.
Thompson, K. M., Idaho
VanGilder, P. B., W. Va.
Vass, G. R., S. C.
Woodrum, H. G., W. Va.

Member

Bancker, J .S., Me.
Becker, P. C., Ohio
Becker, W. B., Mass.
Bloomer, D. H., Ala.
Brandes, R. A., Wash.
Bridges, W. J., Ala.
Brown, H. E., Wash.
Bucciarelli, F. V., N. H.
Burr, M. H., Me.
Carlisle, G. D., Me.
Chapman, G. L., Me.
Coskey, J. W., Wash.
Erickson, H. D., Wash.
Floe, S. M., Wash.
Fuller, R. L., Wash.
Fraser, D. L., Wash.
Goodyear, T. S., Wash.
Grell, H. V., Wash.
Kidd, W. J., Jr., Me.
King, F. C., Me.
Koltz, A. C., Wash.
Knight, F. A., Me.
Loners, E., Wash.
Marsh, R., Jr., Ga.
Merrill, W. J., Me.
Mills, R., Canada
Murnen, E. J., Wash.
Nelson, R. K., Minn.
Olson, L. G., Wash.
Orell, B. L., Wash.
Orsi, C. R., Mass.
Peabody, J. L., Mass.
Proell, A. K., N. H.
Ramstad, R. M., Wash.
Stier, R. E., Wash.
Taylor, D. R., Wash.
Tinney, W. A., Wash.
Tulloch, C. E., Wash.
Vousden, J. A., Ga.
Wheeler, W. E., Wash.
Williamson, M. J., Me.
Zach, L .W., Alaska

Reinstated Junior

Campbell, D., Ark.
Lutz, J. F., Wis.

Subject Matter Committees Appointed for Foresters' Field Manual

An Editorial Committee and 19 subject matter committees appointed to compile the *Foresters' Field Manual* are now at work.

It will be recalled that the Council, at its midyear meeting last June, decided to proceed with the compilation of the manual. This action was in accordance with the recommendation of a special committee which explored the subject and reported favorably on it to the Society at the Minneapolis meeting in December 1947. (See the JOURNAL for March 1948, page 201.)

Editorial Committee

Supervising the project is an Editorial Committee of three, consisting of the following members:

Chairman: E. W. Littlefield, Division of Lands and Forests, New York Conservation Department, Albany 7, N. Y.

William Maughan, Cary Lumber Company, Durham, N. C.

James G. Osborne, Forest Service, U. S. Department of Agriculture, Washington 25, D. C.

Ex officio: Henry Clepper, Society of American Foresters, Washington 6, D. C.

Editor: Serving as part-time paid editor under the supervision of this Editorial Committee is R. D. Forbes, consulting forester, Ambler, R. D. 1, Pa.

Subject Matter Committees

It is the job of the 19 subject matter committees to assemble the material to be included in the manual. All committees have been organized and have been given instructions to report within six months. Their part of the assignment is to be completed by next November.

Committee on Aerial Photography

Chairman: S. H. Spurr, Harvard Forest, Petersham, Mass.

Earl J. Rogers, Northeastern Forest Experiment Station, 102 Motors Avenue, Upper Darby, Pa.

Miles Standish, Brown Company, Berlin, N. H.

George W. Stanley, % Pomeroy and McGowin, Monticello, Ark.

Committee on Communications

Chairman: Elmer Surdam, 1847 Orchard Street, Eugene, Ore.

Ray L. Atkinson, Florida Forest Service, Tallahassee, Fla.

William S. Bromley, American Pulpwood Association, 220 East 42nd Street, New York, N. Y.

W. H. Oettmeier, Superior Pine Products Company, Fargo, Ga.

Committee on Economics and Finances

Chairman: Henry Vaux, School of Forestry, University of California, Berkeley 4, Calif.

M. W. Humphrey, Department of Forestry, Pennsylvania State College, State College, Pa.

H. R. Josephson, U. S. Forest Service, Washington 25, D. C.

L. A. Nix, Indian Grove Road, R. R. 2, Port Credit, Canada.

Raymond E. Stevens, 419 Lyceum Building, Duluth, Minn.

R. H. Van Voorhis, P. O. Box 426, University, Ala.

Committee on Entomology and Pathology

Chairman: L. W. R. Jackson, School of Forestry, University of Georgia, Athens, Ga.

R. E. Balch, Dominion Entomological Laboratory, Fredericton, N. B., Canada.

Jesse D. Diller, Bureau of Plant Industry, U. S. Department of Agriculture, Beltsville, Md.

Henry N. Putnam, Box 474, 628 E. Michigan Street, Milwaukee, Wis.

Noel D. Wygant, 308 Agric. Building, Colorado A & M College, Fort Collins, Colo.

W. A. Campbell, U. S. Division of Forest Pathology, University of Georgia, Athens, Ga.

Committee on Fire Protection

Chairman: Lawrence F. Cook, National Park Service, Washington 25, D. C. (Home: 7924 16th Street, N.W., Washington 12, D. C.)

Jack S. Barrows, U. S. Forest Service, Federal Building, Missoula, Mont.

Royce O. Cornelius, Weyerhaeuser Timber Company, Bend, Ore.

A. B. Curtis, Clearwater Timber Protective Association, Orofino, Idaho.

Carl A. Gustafson, U. S. Forest Service, Washington 25, D. C.

B. H. Paul, County Forestry Department, 524 North Spring Street, Los Angeles, Calif.

Kenneth Seigworth, Tennessee Valley Authority, Norris, Tenn.

William H. Smith, 282 Rumson Drive, Wilson Park, Harrisburg, Pa.

Committee on Forest Measurements

Chairman: A. M. Herrick, Department of Forestry, Purdue University, Lafayette, Ind.

E. T. Hawes, 229 Shadowmoor Drive, Decatur, Ga.

R. S. Johnson, Mersey Paper Company, Liverpool, Nova Scotia.

Bert R. Lexen, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

H. Arthur Meyer, Department of Forestry, Pennsylvania State College, State College, Pa.

Harold Mountain, Brown Company, Berlin, N. H.

Lowell Besley, Department of Forestry, University of British Columbia, Vancouver, B. C.

Committee on Forest Recreation

Chairman: James H. Tyndall, 536 N. Harlem Avenue, River Forest, Ill.

Fred Arnold, National Park Service, Richmond, Va.

Ray E. Bassett, U. S. Forest Service, Milwaukee 3, Wis.

Karl Dressel, Department of Forestry, Michigan State College, East Lansing, Mich.

L. A. Garrison, Grand Canyon National Park, Grand Canyon, Ariz.

William N. Parke, 1526 N.E. 58th Avenue, Portland 13, Ore.

Committee on Forest-Wildlife Management

Chairman: Paul D. Dalke, Idaho Cooperative Wildlife Research Unit, Moscow, Idaho.

Fred P. Cronemiller, U. S. Forest Service, 630 Sansome Street, San Francisco 11, Calif.

Ralph R. Hill, U. S. Forest Service, Denver, Colo.

Richard M. May, 125A Ardmore Avenue, Ardmore, Pa.

Norman F. Smith, Department of Conservation, Lansing 13, Mich.

W. L. Webb, New York State College of Forestry, Syracuse 10, N. Y.

Committee on Hydraulics and Forest Influences

Chairman:

L. V. Kline, Department of Forestry Relations, Tennessee Valley Authority, Norris, Tenn.

E. G. Dunford, Rocky Mountain Forest and Range Experiment Station, Fort Collins, Colo.

Charles R. Hursh, Route 3, Box 660, Asheville, N. C.

Howard W. Lull, U. S. Forest Service, Washington 25, D. C.

Committee on Logging

Chairman: Alexander Koroleff, Pulp and Paper Research Institute of Canada, 3420 University Street, Montreal, P. Q., Canada.

C. H. Niederhof, West Virginia Pulp and Paper Company, Box 832, Charleston, S. C.

Fred Simmons, Northeastern Forest Experiment Station, Bankers Securities Building, Philadelphia, Pa.

A. E. Wackerman, Duke School of Forestry, Durham, N. C.

Lester E. Calder, Box 275, Springfield, Ore.

E. W. Fobes, Forest Products Laboratory, Madison 5, Wis.

J. B. Gilmour, 5823 McLynn Ave., Montreal 29, Canada.

F. Malcolm Knapp, Department of Forestry, University of British Columbia, Vancouver, B. C., Canada.

C. R. Silversides, Abitibi Power and Paper Co., Ltd., 408 University Avenue, Toronto 2, Canada.

J. K. Pearce, College of Forestry, University of Washington, Seattle 5, Wash.

Committee on Management

Chairman: Thomas Orr, Jr., Weyerhaeuser Timber Company, Klamath Falls, Ore.

Clifford H. Foster, Pack Forest, Warrensburg, N. Y.

Charles A. Genaux, Bureau of Land Management, Department of the Interior, Washington 25, D. C.

R. S. Kearns, Mason, Bruce, and Girard, American Bank Building, Portland, Ore.

T. A. Liefeld, 121 N. Hansell Street, Thomasville, Ga.

E. B. Moore, Department of Conservation, State House Annex, Trenton, N. J.

Richard C. Smith, Duke School of Forestry, Durham, N. C.

Arnold F. Wallen, 1209 Eighth Avenue, Oakland 6, Calif.

Harold Weaver, 3137 N. 18th Avenue, Phoenix, Ariz.

Fred C. Wilson, Department of Conservation, State Office Building, Madison, Wis.

Committee on Materials, Structures, and Facilities

Chairman: William C. Sechrist, Mont Alto, Pa.

Arthur K. Roberts, West Coast Lumbermen's Association, 1410 S. W. Morrison Street, Portland, Ore.

T. J. Starker, Route 4, Box 187, Corvallis, Ore.

Committee on Mathematics

Chairman: H. H. Morgan, Office of International Trade, U. S. Department of Commerce, Washington 25, D. C. (Home, 106 U Street, N. E., Washington 17, D. C.)

Lewis R. Grosenbaugh, Southern Forest Experiment Station, Federal Office Building, New Orleans 12, La.

Merton Henry, Box 74, Bevans, N. J.

Clement Mesavage, Post Office Building, Harrison, Ark.

Arthur D. Read, 308 Riggs Road, West Monroe, La.

Committee on Physics and Chemistry

Chairman: Edwin Jahn, New York State College of Forestry, Syracuse 10, N. Y.

Alfred J. Stamm, Forest Products Laboratory, Madison, Wis.

Committee on Range Management

Chairman: Vernon A. Young, Range and Forestry Department, Texas A & M College, State College, Texas.

Milo Deming, Bureau of Land Management, U. S. Department of the Interior, P. O. Box 659, Salt Lake City 9, Utah.

Lincoln Ellison, Intermountain Forest and Range Experiment Station, Ogden, Utah.

A. L. Hormay, P. O. Box 245, Berkeley 1, Calif.

Joseph M. Jackson, Flathead Indian Agency, Dixon, Mont.

Arnold R. Standing, U. S. Forest Service, Box 4137, Portland 8, Ore.

Joe A. Wagner, Papago Indian Agency, Sells, Ariz.

Clinton Wasser, Colorado A & M College, Fort Collins, Colo.

Committee on Silviculture

Chairman: Russell K. LeBarron, Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont.

D. A. Anderson, Texas Forest Service, College Station, Texas.

Leo A. Isaac, Pacific Northwest Forest Experiment Station, Portland, Ore.

S. S. Locke, 434 North Plankinton Avenue, Milwaukee 3, Wis.

H. H. Tryon, 258 Mt. Road, Cornwall-on-Hudson, N. Y.

Ross A. Williams, School of Forestry, Montana State University, Missoula, Mont.

Committee on Soils and Geology

Chairman: S. A. Wilde, University of Wisconsin, Madison, Wis.

John T. Auten, Central States Forest Experiment Station, Old Federal Building, Columbus, Ohio.

T. S. Coile, Duke School of Forestry, Durham, N. C.

Harold J. Lutz, Yale School of Forestry, New Haven 11, Conn.

T. B. Plair, Soil Conservation Service, Swan Island, Portland 18, Ore.

Earl L. Stone, Department of Agronomy, Cornell University, Ithaca, N. Y.

Donald P. White, New York State College of Forestry, Syracuse, N. Y.

Committee on Surveying and Civil Engineering

Chairman: A. P. Dean, U. S. Forest Service, Washington 25, D. C.

T. P. Bixby, 403 E. 11th Street, Ellis, Kan.

Marie-Albert Bourget, 40 Avenue des Braves, Quebec, P. Q., Canada.

Ralph G. DeMoisy, Anderson Hall, University of Washington, Seattle 5, Wash.

James Dubuar, State Ranger School, Wanakena, N. Y.

Harold P. Miller, 2723 NE 38th Avenue, Portland, Ore.

Committee on Utilization

Chairman: Roy M. Carter, Department of Forestry, North Carolina State College, Raleigh, N. C.

George Amidon, Minnesota and Ontario Paper Company, International Falls, Minn.

Claude C. Bell, Forest Products Laboratory, Madison, Wis.

O. Harry Schrader, College of Forestry, University of Washington, Seattle, Wash.

L. W. Smith, U. S. Forest Service, Washington 25, D. C.

Joseph L. Stearns, Timber Engineering Company, 1319 - 18th Street, N. W., Washington, D. C.

Cooperation Invited

The cooperation of all members of the Society is invited in seeing this project successfully completed. Any forester who may have suggestions about any aspect of this undertaking is most cordially urged to write either to the chairman of the particular subject matter concerned, or, if the suggestion involves the project as a whole, to Mr. Forbes.

Society of American Foresters' List of Consulting Foresters

The following List of Consulting Foresters is published by the Society of American Foresters for the information of prospective clients.

Individuals listed are members of the Society of American Foresters and as such are believed qualified and competent to perform the specialized technical services specified. However, the Society cannot assume responsibility for the actions of individuals or firms listed.

Members of the Society in 1948 adopted a Code of Ethics for the forestry profession. Its purpose is to formulate guiding principles of professional conduct for foresters in their relations with each other, with their employers, and with the public. Copies are available on request.

Permission to publish or reproduce this list in whole or in part, but without unauthorized additions, is hereby granted. Amended lists will be issued annually.

Code of Fields of Specialization

1. Arboriculture and tree preservation.
2. Cost and economic studies of forest operations.
3. Forest and wood utilization.
4. Forest management and silvicultural practice.
5. Forest protection from disease.
6. Forest protection from fire.
7. Forest protection from insects.
8. Forest taxation.
9. Game and wildlife management.
10. Logging engineering.
11. Market studies and trade promotion (forest products).
12. Naval stores operations.
13. Pulpwood operations.
14. Range management.
15. Surveying and mapping.
16. Timber valuation and appraisal.
17. Timber volume and quality estimates.
18. Tree planting and reforestation; reproduction studies.
19. Wood preservation.
20. Wood seasoning.
21. Wood technology.

Ace Engineers and Surveyors, 8520 30th Avenue, N.E., Seattle 5, Washington.
Consultant: Robert W. Jones.
Territory: Washington.
Specialization: 10, 15, 17.

John D. Atkins, Jr., 502 Belleview Drive, Falls Church, Virginia.
Territory: Virginia, Maryland.
Specialization: 4, 16, 17.

S. Gayley Atkinson, Consulting Forester, 1152 Colonial Avenue, Roslyn, Pennsylvania.
Territory: Pennsylvania.
Specialization: 1, 18.

Harrison V. Bailey, 8 Ashby Street, Alexandria, Va.
Specialization: Consultant in industrial forestry, to industries using forest products, and to importers of precious and fine utility woods, mainly tropical.

Henry L. Bango, Consulting Forester, P. O. Box 4072, Shreveport, Louisiana.
Territory: Northern Louisiana.
Specialization: 3, 4, 5, 16, 17, 18. Also purchase and sale of timbered properties.

George Banzhaf & Company, 662 North Water St., Milwaukee 2, Wisconsin.
Territory: Lake States.
Specialization: 2, 4, 13, 15, 16, 17.

Travis M. Beeson, Forest Consultant & Reforestator, Walterboro, South Carolina.
Territory: Southern states.
Specialization: 2, 3, 4, 11, 13, 16, 17, 18. Equipped to plant three million seedlings per season.

Belanger and Bourget, Land Surveyors and Forest Engineers, 86 Cote de la Montagne, Quenec, Canada.
Consultant: Albert Bourget.
Territory: Canada, especially Quebec.
Specialization: 2, 3, 4, 10, 11, 13, 15, 16, 17, 19, 20, 21. Also boundary lines.

Bigley and Feiss, Foresters, Inc., 283 Miner Building, Eugene, Oregon.
Consultants: Michael Bigley, Sherman Feiss.
Territory: Washington, Oregon, California.
Specialization: 2, 3, 4, 6, 15, 16. Also sustained yield plans, supervision of contract logging, and timberland sales.

Jack C. Blakeney, Consulting Forester, % Hickory Handle Co., Inc., P. O. Box 253, Batesburg, South Carolina.
Territory: South Carolina.
Specialization: 3, 4, 6, 7, 11, 13, 16, 17, 18.

Gordon Bowker, Consulting Forester, Paul Smith's College, Paul Smiths, N. Y.
Territory: Eastern U. S.
Specialization: 4, 9, 15, 16, 17, 20. Also advice on plantation management.

Allen W. Bratton, Consulting Forester, Shelterwood, Cooperstown, New York.
Territory: Northeast.
Specialization: 4, 5, 6, 7, 8, 11, 15, 16, 17, 18.

Charles H. Bunting, Timber Cruiser, Room 717, 300 Montgomery Street, San Francisco, California.
Territory: California.
Specialization: 2, 10, 15, 16, 17.

California Foresteering, 429 Main Street, Placerville, California.
Consultant: Wm. B. Berry.
Territory: California pine region.
Specialization: 2, 3, 4, 10, 16. New solutions to the old problems of logging, milling, and timber management.

N. D. Canterbury, Consulting Forester, 1612 Ruth Street, Houston 4, Texas.
Territory: Texas and southeastern U. S.

Aldis J. Christie, Forester, 14 Wellington Road, Manchester, New Hampshire.
Territory: Southern New Hampshire.
Specialization: 4, 15, 16, 17, 18. Also forest management plans for municipal water supply watersheds.

David B. Cook, Consulting Forester, 14 Nolan Road, Albany 5, New York.
Territory: Eastern New York.
Specialization: 4, 8, 9, 13, 16, 18.

Philip T. Coolidge, Consulting Forester, 31 Central Street, Bangor, Maine.
Territory: Not limited.
Specialization: 2, 4, 8, 10, 13, 15, 16, 17, 18. Also farm appraisal.

William T. Cox, Consulting Forester—Biologist, 2186 Doswell Avenue, St. Paul 8, Minnesota.
Territory: General.
Specialization: 4, 9, 16. Also appraisals of tropical forest properties; development of furbearers and other wildlife; selection of new locations for woodworking plants.

James W. Craig, Consulting Forester, Leavell Woods Substation, Jackson, Mississippi.
Territory: Mississippi and the South.
Specialization: 3, 4, 6, 13, 15, 16, 17, 18. Also complete line of forestry supplies.

Keith Cranston, Timber Estimating Services, Leland, Mississippi.
Territory: Mississippi delta and Gulf States.
Specialization: 2, 3, 4, 10, 11, 13, 16, 17. Acting as forest counsel on mill company and privately owned bottomland hardwood and pine tracts.

John M. Crowl, Consulting Forester, Route 5, Cadiz, Ohio.
Territory: Not Limited.
Specialization: 1, 2, 3, 5, 6.

Randle J. Dedeaux, Consulting Forester, P. O. Box 52, Perkingston, Mississippi.
Territory: Southern Mississippi; longleaf and slash pine types.
Specialization: 4, 13, 15, 17. Also growth studies, timber marking and marketing, and agent for absentee timberland owners.

W. T. Doherty, Consulting Forester, 1020 West Park Avenue, Albuquerque, New Mexico.
Territory: Arizona, New Mexico.
Specialization: 4, 15, 16, 17. Also land classification.

Perry O. Donaldson & Associates, Consulting Foresters, 901 Rust Building, Tacoma 2, Washington.
Territory: Pacific Coast states.
Specialization: 4, 6, 10, 15, 16, 17, 18.

James D. L. Drake, Consulting Forester, 1010 Stock Exchange Building, Vancouver, British Columbia, Canada.
Territory: Washington, Oregon, British Columbia.
Specialization: 4, 10, 13, 15, 16, 17, 18. Also forest production problems; seed sales of Pacific Coast and Alaska species; acquisition and management of timberland properties.

Paul R. Dumas, Consulting Forester, 103 York Street, Rumford, Maine.
Territory: Northeast.
Specialization: 2, 4, 6, 8, 10, 11, 13, 15, 16, 17, 18.

William A. Eastman, Jr., Consulting Forester, William A. Eastman & Co., Inc., 410 Green Building, Seattle 1, Washington.
Territory: Pacific Northwest.
Specialization: 10, 15, 16, 17, 18. Also preparation and administration of timber sales, land appraisal, timberland brokerage, and timberland management.

Nils B. Eckbo, Consulting Forester, 26 Rhodes Avenue, Parktown, Johannesburg, South Africa.
Territory: Southern Africa.
Specialization: General forestry.

John B. Evans, Consulting Forester, 57 Prospect Street, Lancaster, New Hampshire.
Territory: Northeast.
Specialization: 4, 6, 15, 16, 17, 18.

George M. Fisher, Consultant Forester and Landscape Engineer, 1701 Louisiana Street, Lawrence, Kansas.
Territory: Kansas, Missouri, Iowa, Nebraska.
Specialization: 1, 4, 5, 7, 11, 18. Also farm forestry; city forestry and shade tree problems; plant materials and planting lists; landscape design, construction, and maintenance; forest parks and recreational planning.

Reginald D. Forbes, Consulting Forester, R.F.D. 1, Ambler, Pennsylvania.
Territory: Eastern U. S.
Specialization: 4, 6, 17, 18. Also forest resource surveys of timber available to manufacturing plants in specified territories.

Forest Managers, Inc., Consulting Foresters, 211 Beach Avenue, Atlantic Beach, Florida and 1826 N. Orchard Street, Santa Rosa, California.
Consultants: S. J. Hall, D. Eric Bradshaw, Nelson B. Blocker.
Territory: South and Southeast, including Appalachains; also redwood region.
Specialization: 3, 4, 6, 8, 12, 13, 15, 16, 17, 18. Also pulpwood resource investigations, timberland management, timberland brokerage, insurance company representative for loans on forest properties.

Emannel Fritz, Consulting Forester, 102 The Uplands, Berkeley, California.
Territory: California; pine and redwood.
Specialization: 2, 3, 4, 6, 10, 11, 16, 17, 18, 19, 20, 21. Also consultant on state forest and park management and policy.

LeRoy Frontz, Consulting Forester, Allenwood, Pennsylvania.
Territory: Eastern U. S.
Specialization: 3, 4, 5, 6, 7, 9, 16, 17, 18. Also landscaping, forest and ornamental nurseries, farm forestry, forest parks and recreation, landuse planning, soil conservation, farm evaluation and appraisal.

John D. Gilmour, Consulting Forester, 5823 McLynn Avenue, Montreal, Quebec, Canada.
Territory: Not Limited.
Specialization: 2, 4, 8, 10, 16, 17. Also tropical forestry and logging.

A. R. Gobeil, Consulting Forest Engineer, 13 Place D'aiguillon, Quebec, Canada.
Territory: Quebec.
Specialization: 4, 5, 7, 9, 13, 15, 18. Also purchase and sale of timbered properties, landscape engineering, and public relations.

Winslow L. Gooch, Forestry Consultant, West Point, Virginia.
Territory: United States, Central and South America, Africa, Europe.
Specialization: 2, 3, 8, 11, 13, 15, 16, 17, 20, 21. Also investigations on vegetable tannin research, foreign cabinet timbers, and forest litigation.

Norman H. Gray, Consulting Forester, Fryeburg, Maine.
Territory: Maine, New Hampshire.
Specialization: 3, 4, 13, 15, 16, 17, 18.

T. F. Grayson and Company, Commercial Foresters, P. O. Box 110, Prescott, Arkansas.
Territory: Southeastern U. S.
Specialization: 2, 4, 8, 10, 11, 13, 15, 16, 17, 18. Also timber purchase, sale, management, and millsite locations.

Green's Timber Service, Johnson City, Tennessee.
Consultant: L. Stanley Green.
Territory: Southeastern U. S.
Specialization: 2, 3, 4, 6, 10, 13, 16, 17, 18. Also custom sawmilling.

Clarence W. Griffith, 1001 Ouachita Bank Building, Monroe, Louisiana.
Territory: United States and Central America.
Specialization: 4, 15, 16, 17. Also purchase and sale of timbered properties.

E. C. Haff, Forester, 836 Edisto Avenue, N.W., Orangeburg, South Carolina.
Territory: Within 100 miles of Orangeburg.
Specialization: Management of timber properties.

William H. Haley, Consulting Forester, Hazlehurst, Georgia.
Territory: Southern Georgia, northern Florida; pine and hardwood.
Specialization: 12, 13, 15, 16, 17.

Giles G. Hall, Forest Consultant, P. O. Box 1, 804 Florence Street, Aiken, South Carolina.
Territory: South Carolina, Georgia.
Specialization: 2, 3, 4, 5, 6, 7, 10, 11, 13, 16, 17, 18. Also tree pruning in planted stands.

Hammon, Jensen, and Wallen, Mapping and Forestry Services, 1209 8th Avenue, Oakland 6, California.
Consultants: Herbert A. Jensen, Arnold F. Wallen.
Territory: Principally California, Nevada, and the Southwest, but also elsewhere.
Specialization: 2, 3, 4, 6, 8, 10, 11, 13, 15, 16, 17, 18. Also planimetric and topographic mapping, land net delineation, general land classification for appraisal purposes and ranchland management, and aerial photogrammetric consulting service. Emphasis on aerial photo techniques in all activities.

David H. Hanaburgh, Consulting Forester, Buchanan, New York.
Territory: Northeast.
Specialization: 2, 3, 4, 9, 10, 11, 13, 16, 17. Also negotiation of rights for hunting, fishing, trapping, and water storage.

Ralph C. Hawley, Consulting Forester, R. D. 1, West Cheshire, Connecticut.
Territory: Northeast.
Specialization: 4, 6, 16, 18.

K. J. Helmick, Consulting Forester, Fort Collins, Colorado.
Territory: Colorado, Wyoming, South Dakota, Utah, New Mexico.
Specialization: 4, 10, 15, 16, 17.

Hiram L. Henderson, Manufacturer of Dry Kilns, 119 Stone Ridge Drive, Syracuse, New York.
Territory: Principally eastern states.
Specialization: 20. Also construction of lumber dry kilns.

Merton Henry, Consulting Forester-Arborist, Old Flatbrook Road, Bevans, New Jersey.
Territory: Eastern U. S.
Specialization: 1, 4, 5, 7, 15, 16, 17, 18. Also technical editing.

Halsey M. Hicks, Consulting Forester, R. F. D. 3, Brattleboro, Vermont.
Territory: Vermont.
Specialization: 2, 3, 4, 8, 15, 16, 17.

Hamilton D. Hill, Consulting Forester, Glacier Creek Ranch, Seeley Lake, Montana.
Territory: Northern Rocky Mountain region.
Specialization: 4, 15, 16, 17, 18. Also highway location and construction surveys; detailed topographic surveying and mapping preliminary to irrigation.

Monterey L. Holst, Consulting Forester, P. O. Box 125, East Greenwich, Rhode Island.
Territory: New England.
Specialization: 3, 4, 6, 9, 10, 13, 15, 16 , 17, 18, 21.

Richard F. Howard, 15 Cherry Street, Franklinville, New York.
Territory: Pennsylvania, New York, New England.
Specialization: 3, 4, 6, 15, 16, 17, 18. Also logging and silviculture weedings and thinnings on a contract basis.

T. M. Howerton, Jr., Consulting Forester, Madison, Florida.
Territory: Southeastern states.
Specialization: 2, 3, 4, 5, 6, 7, 10, 11, 12, 13, 15, 16, 17, 18. Also forest land acquisition, marketing of forest products, and land management.

Gustaf W. Hult, Consulting Forester, 3029 Johnson Street, Corvallis, Oregon.
Territory: Oregon, northern California.
Specialization: 16, 17. Also both Douglas fir and pine management; licensed real estate broker in Oregon.

George D. Hunter, Consulting Forester, P. O. Box 244, Latham, New York.
Territory: New York and New England.
Specialization: 1. Also landscape design.

LeRoy W. Huntington, Consulting Tropical Forester, 52 Wesley Street, Baldwin, New York.
Territory: Latin America, Orient, Africa.
Specialization: 2, 3, 4, 10, 11, 15, 16, 17, 18; and tropical hardwoods.

R. Wilson Hutchison, Consulting Forester and Logging Engineer, 720 Harlow Road, Eugene, Oregon.
Territory: Washington, Oregon, California.
Specialization: 2, 3, 4, 6, 10, 15, 16, 17. Registered professional engineer of the State of Oregon.

Gorham E. Jackson, Consulting Forester, 1035 Respass Street, Washington, North Carolina.
Territory: Eastern North Carolina, southeastern Virginia. All forest types.
Specialization: 2, 4, 6, 9, 10, 13, 15, 16, 17, 18. Also investigations of forest resources for pulp and paper companies, and land agent for absentee timberland owners.

M. E. Jelley, Consulting Forester, 122 Haywood Avenue, Chattanooga 5, Tennessee.
Territory: Southeastern and eastern states.
Specialization: 2, 3, 4, 6, 8, 10, 11, 13, 15, 16, 17.

David G. Jennings, Consulting Forester, 206 Chestnut Street, Port Jefferson, New York.
Territory: New York.
Specialization: 1, 3, 4, 6, 15, 18.

E. V. Jotter, Consulting Forester, Box 51, Cambridge, Ohio.
Territory: Ohio.
Specialization: 3, 4, 6, 9, 11, 16, 17, 18. Also development and management of community forests, conservation education, cooperation with soil conservation districts.

Stuart G. Keedwell, Consulting Forester, Emporia, Virginia.
Territory: Southeastern U. S.
Specialization: 4, 10, 11, 15, 16, 17. Also forest litigation and purchase and sale of land and timber.

John F. Kellogg, Forester, Route 1, Winnifield, Louisiana.
Territory: Louisiana and southern Arkansas; pine and hardwood.
Specialization: 3, 4, 5, 16, 17.

Henry S. Kernan, Consulting Forester, South Worcester, New York.
Territory: Central New York.
Specialization: 3, 4, 5, 6, 7, 9, 10, 13, 15, 16, 17, 18.

H. Thorn King, Consulting Forester, Hancock, New Hampshire. (S.A.F. Affiliate Member.)
Territory: Southwestern New Hampshire.
Specialization: 2, 4, 15, 17. Also title investigations, scaling, marking, and surveying.

Robert K. Knoth & Company, Foresters, Appraisers, Surveyors, 39 Broad Street, Charleston 3, South Carolina.
Consultants: Robert K. Knoth, Joseph A. Schmidt.
Territory: Southern and tropical timberlands.
Specialization: 4, 6, 10, 11, 13, 15, 16, 17, 18. Land agent for absentee timberland owners; foreign timberland investigations.

The Langdale Company, P. O. Box 980, Valdosta, Georgia.
Consultants: Harley Langdale, Jr., T. E. Connell.
Territory: Georgia, northern Florida; slash pine belt.
Specialization: 2, 3, 4 ,6, 8, 9, 10, 11, 12, 13, 15, 16, 17, 18, 19. Also custom sawing.

Wilfred H. Lauer, Jr., Consulting Forester, P. O. Box 329, Winona, Minnesota.
Territory: North Central States.
Specialization: 3, 4, 10, 11, 13, 16, 17, 20. Also tree selection and marking for cutting; log scaling and grading; marketing and products brokerage; and private, industrial, and farm forestry.

Frank J. Lemieux, Consulting Forester, 734 Whitney Building, New Orleans, Louisiana.
Territory: Southern states, Mexico, Central and South America.
Specialization: 2, 4, 6, 13, 15, 16, 17.

Paul C. Lemon, Consulting Forester, State College, Albany 3, New York.
Territory: New York.
Specialization: 1, 6, 9, 14. Also commercial pilot, applications of aviation to forestry.

T. A. Liefeld, Consulting Forester, Thomasville, Georgia.
Territory: Florida, Georgia.
Specialization: 2, 3, 4, 5, 6, 7, 8, 11, 12, 13, 15, 16, 17, 18.

L. D. Lloyd & Co., Consulting Foresters, P. O. Box 1029, Camas, Washington.
Consultants: Leslie D. Lloyd, William O. Gansberg.
Territory: Oregon, Washington; pine and Douglas-fir areas.
Specialization: 2, 3, 4, 5, 6, 10, 13, 15, 16, 17.

Ludwig Bros., Engineers, 608 South Fair Oaks Avenue, Pasadena 2, California.
Consultant: Gordon W. Ludwig.
Territory: California.
Specialization: 2, 4, 6, 7, 15, 16, 17, 18. Also specialist in soils and soil science. Associated with registered civil engineers specializing in sewage and water treatment.

Donald K. Maissurow, Consulting Forester, New Haven Avenue, Derby, Connecticut.
Territory: New England.
Specialization: 1, 4, 5, 7, 15, 16, 17, 18. Also landscape forestry.

Chas. O. Marston, Consulting Forester and Engineer, Osburn Hotel, Eugene, Oregon.
Territory: Washington, Oregon, California.
Specialization: 2, 4, 10, 16, 17, 18. Also agent for absentee timberland owners.

Mason, Bruce, & Girard, Consulting Foresters, American Bank Building, Portland 5, Oregon.
Consultants: David T. Mason, James W. Girard, R. S. Kearns, Karl D. Henze, Ralph D. Marlatt, Gilbert M. Bowe, Charles S. Lewis.

F. Douglas Mavor, Consulting Forester and Logging Engineer, Sedro Wooley, Washington.

Earl M. McChesney, Consulting Forester, 4 New York Street, Bangor, Maine.
Territory: Maine, New York.
Specialization: 1, 4, 15, 17, 18. Also personnel work.

Thomas A. McFarland, Consulting and Contracting Forester, Sandersville, Georgia.
Territory: Georgia.
Specialization: 2, 4, 10, 15, 16, 17, 18. Also timber, timberland, and farmland broker.

Hayden E. Meeker, Jr., Consulting Forester, 1323 Catula Avenue, Lafayette, Indiana.
Territory: Indiana, central Illinois.
Specialization: 2, 4, 5, 6, 8, 11, 15, 16, 17, 18.

Fred B. Merrill, Consulting Forester, Box 66, Zachary, Louisiana.
Territory: Mississippi and Louisiana. Within 100 miles of Baton Rouge.
Specialization: 4, 5, 6, 7, 11, 16, 17. Also buying and selling timberlands; training estate and company personnel; and Cylord pulpwood dealer in East and West Feliciana Parishes.

William J. Mills, Forest Engineer, 530 Volunteer Building, Chattanooga 2, Tennessee.
Territory: Southeastern states, all forest types: Mexico, oak.
Specialization: 3, 4, 11, 13, 15, 16, 17.

Malcolm A. Milne, Consulting Forester and Landscape Engineer, 433 Clay Avenue, Rochester, New York.
Territory: Central and western New York.
Specialization: 1, 5, 7, 18. Also landscaping, estate development and management, and forest recreation.

R. B. Milne, Consulting Forester, Box 371, Petersburg, Virginia.
Territory: Eastern states; all forest types.
Specialization: 3, 4, 10, 16, 17.

Stuart Moir, Forest Counsel, Western Forestry and Conservation Association, 712 U. S. National Bank Building, Portland 4, Oregon.
Territory: Western states.

Wm. Mollenhauer, Jr., Landuse Consultant, 186 West Avenue, Pitman, New Jersey.
Territory: New Jersey.
Specialization: 4. Also flood and erosin control; ecological surveys of plant and animal relations in forest and rural areas; and economic and social surveys of forest and rural areas, including labor relations.

Robert Moore, Consulting Forester, Danville, Pennsylvania.
Territory: Not restricted.
Specialization: 2, 3, 4, 6, 8, 10, 11, 13, 15, 16, 17, 18, 19. Also bankruptcy cases, trade association work, coal lands, trusteeship cases, litigation and damage claims; estate problems.

Kenneth J. Morgan, Consulting Forester, Stephen F. Austin State College, Nacogdoches, Texas.
Territory: Texas and the East.
Specialization: 1, 3, 4, 15, 16, 17, 18. Also farm forestry, erosion control, and general protection.

Lee H. Morrow, Consulting Forester, Box 105, Warriors Mark, Pennsylvania.
Territory: Pennsylvania.
Specialization: 1, 2, 3, 4, 5, 6, 7, 10, 11, 13, 15, 16, 17, 18. Also erosion control of large embankments by engineering structures and vegetative treatment; and property maps and forest type maps from aerial photographs.

Edgar J. Murnen, Jr., Consulting Forester, Sutherlin, Oregon.
Territory: Pacific Northwest, northern California.
Specialization: 2, 3, 4, 15, 16, 17. Also sustained yield plans, supervision of contract logging, and land acquisition programs.

A. Z. Nelson, Consulting Forester, New Ipswich, New Hampshire.
Territory: U. S., Canada, Alaska.
Specialization: 2, 4, 8, 11, 16, 17.

Chris Nelson, Jr., Consulting Forester, P. O. Box 447, Corrigan, Texas.
Territory: Eastern Texas or anywhere.
Specialization: 4, 11, 17.

New England Forestry Foundation, 3 Joy Street, Boston 8, Massachusetts.
Consultants: Harris A. Reynolds, Kenneth E. Jones, Raymond E. Anderson, J. Milton Attridge, Walter L. Koenig, Stanley B. Coville, Stephen L. Jacobs.
Territory: New England.
Specialization: 2, 3, 4, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 18.

Samuel A. Newman, P. O. Box 156, Everett, Washington.
Territory: Washington.
Specialization: 8, 15, 16, 17. Also timber broker.

Leon A. Nix, Consulting Forester and Logging Expert, R. R. No. 2, Port Credit, Ontario, Canada.
Territory: Not limited.
Specialization: 2, 3, 4, 6, 10, 13, 15, 16, 17. Also farm woodlot management.

W. R. Owens, Jr., Consulting Forester, Box 246, North Street Station, Nacogdoches, Texas.
Territory: Eastern Texas, Louisiana, the South in general.
Specialization: 4, 10, 12, 13, 15, 16, 17, 18.

Gustave C. Piche, Consulting Forest Engineer, 3667 St. Hubert Street, Montreal, Quebec, Canada.
Territory: Eastern Canada, particularly the Province of Quebec.
Specialization: 2, 3, 4, 13, 15, 16, 17, 18, 21. Also farm forestry.

Pomeroy & McGowin, Forest Managers, Monticello, Arkansas and Chapman, Alabama.
Consultants: L. K. Pomeroy, Julian F. McGowin (S.A.F. Associate Member), Z. W. White, George W. Stanley, Robert R. Eastment, T. R. Scott, B. F. Griffin.
Territory: Southern states.
Specialization: 4, 8, 17. Also aerial forest surveys.

Pond & Moyer, Inc., Co., Consulting Foresters, 107 Homestead Road, Ithaca, New York.
Consultants: James D. Pond, Chas. H. Moyer.
Territory: New York and Northeast, Latin America; northern hardwoods, spruce-fir, central hardwoods, tropical woods.
Specialization: 1, 2, 3, 4, 8, 10, 11, 13, 15, 16, 17, 18, 21.

Prentiss & Carlisle Company, Inc., Timberland Service—Engineers, 107 Court Street, Bangor, Maine.
Consultants: George T. Carlisle, Philip P. Clement, Robert W. Averill, George D. Carlisle, Edward K. Brann.
Territory: United States, Canada.
Specialization: 2, 3, 4, 8, 10, 11, 13, 15, 16, 17, 18.

John G. Rawls Co., Consulting Foresters, 408 Rogers Avenue, Macon, Georgia.
Consultant: John G. Rawls (S.A.F. Affiliate Member).
Territory: Southeast.
Specialization: 10, 12, 13, 15, 16, 17.

Arthur D. Read, Consulting Forester, 308 Riggs Street, West Monroe, Louisiana.
Territory: Southern pine and hardwood region.
Specialization: 4, 15, 16, 17, 18. Emphasizing seed collection, establishment of pine tree nurseries, and outplanting.

Reed Forestry & Equipment Co., Consulting Foresters, Box 102, Smithfield, North Carolina.
Consultant: R. E. Reed.
Territory: Southeastern States; all forest types.
Specialization: 2, 3, 4, 11, 13, 15, 16, 17, 18. Also custom sawing and sale of forestry equipment.

Frank I. Rockwell, Consulting Forester and Landscape Architect, 614 Twelfth Avenue, Brookings, South Dakota.
Territory: Northern and western states, especially Great Lakes and Great Plains regions to West Coast.
Specialization: 1, 3, 4, 5, 6, 7, 8, 9, 14, 15, 16, 17, 18, 19. Also landscape engineering; farm and city forestry; park, farm, and land management, recreational planning.

A. P. Russell, Commercial and Industrial Forester, 11 Maplewood Drive, Sumter, South Carolina.
Territory: Not limited, but principally southern region.
Specialization: 2, 3, 4, 10, 11, 12, 13, 15, 16, 17, 18. Also forest resource surveys for industry, timberland acquisition and sales, contract logging supervision, log scaling and grading.

Sable Mountain Corporation, Rutland, Vermont.
Consultant: Richard C. Rose.
Territory: New England; also forest aerial photography in South.
Specialization: 4, 15, 16, 17. Mapping and cruising by aerial techniques.

Roy Dale Sanders, Visual Education Technician, Rural Route 5, Evrodale, Brainerd, Minnesota.
Territory: Unlimited.
Specialization: Forester, wildlife technician, photographer. The entire production supervision of 16 millimeter color educational motion pictures, including script writing, direction, photography, editing, and sound supervision. Also production of all types of color and black and white still picture visual education material.

C. H. Schaeffer, Summerville, South Carolina.
Territory: South Carolina.
Specialization: 4, 16, 17, 18.

C. D. Schultz and Co., Ltd., Foresters, Forest Engineers, and Timber Counsel, B-102 Pacific Coast Fire Building, 325 Howe Street, Vancouver, British Columbia, Canada.
Consultants: C. D. Schultz, R. D. Schultz.
Territory: British Columbia mainly, but no regional limitations.
Specialization: 2, 3, 4, 6, 8, 10, 11, 15, 16, 17, 18, 20. Also supervision of contract logging; timberland sales; log sales, management of timber holdings; aerial photographic surveys; aerial topographic mapping; fire hazard appraisals.

Thomas F. Schweigert, Consulting Forester, Walloon Lake, Michigan.
Territory: Northern half of Lower Peninsula and eastern half of Upper Peninsula, Michigan.
Specialization: 1, 4, 6, 15, 16, 17, 18. Also contract tree planting; registered land surveyor.

H. C. Scott, Arboriculturist and Landscape Engineer, Lookout Mountain, Tennessee.
Territory: Eastern states.
Specialization: 1. Also landscape construction and woodland improvement.

Harold M. Sebring, Consulting Forester and Sawmill Operator, McRae, Georgia.
Territory: Southeastern states; all forest types.
Specialization: 3, 4, 6, 10, 15, 16, 17.

James W. Sewall Company, Consulting Foresters, Old Town, Maine and Port Arthur, Ontario, Canada.
Consultants: Frank M. Call, Charles G. Reed, Carleton C. Young, Jr.
Territory: Northeast.
Specialization: 3, 4, 5, 8, 13, 15, 16, 17, 18. Also aerial photography.

James R. Simmons, Consulting Forester, 30 Gordon Street, Bel Air, Maryland.
Territory: Eastern states.
Specialization: 2, 3, 4, 10, 11, 13, 14, 15, 16, 17, 18.

Simmons and Stuart, Consulting Foresters, Bel Air, Maryland or Burgess Store, Virginia.
Consultants: James R. Simmons, Edward Stuart.
Territory: Eastern states.
Specialization: 2, 3, 4, 10, 11, 13, 14, 15, 16, 17, 18. Also investigation and arbitration of claims; operational management in the manufacture and marketing of forest products.

Samuel S. Snook, P. O. Box 521, Walterboro, South Carolina.
Territory: South Carolina.
Specialization: 4, 15, 16, 17.

Seymour I. Somberg, Forestry Aids, Manning, South Carolina.
Territory: Southeastern U. S.
Specialization: 2, 3, 4, 8, 10, 11, 13, 15, 16, 17, 20. Acquisition and management for investors; forest resource surveys for industry.

Southern Foresters, Timberland Consultants, Savannah, Georgia.
Consultant: William E. Dunham.
Territory: Southern region.
Specialization: 2, 3, 4, 5, 6, 7, 8, 9, 13, 14, 15, 16, 17, 18.

Southwestern Forest Associates, Consulting Foresters, 518 North Cedar Street, Little Rock, Arkansas.
Consultants: Arthur M. Emmerling, Robert Lee Cain.
Territory: Southern Missouri, Arkansas, Oklahoma, Texas, Louisiana.
Specialization: 2, 3, 4, 8, 10, 11, 13, 15, 16, 17, 18. Also industrial plant appraisals Southwide on aerial photography and aerial inventories.

Frank Spearey, Land Surveyor, Timber Estimator, and Consulting Forester, P. O. Box 547, Nacogdoches, Texas.
Territory: Gulf states.
Specialization: 4, 15, 16, 17. Also timber marking and marketing.

Stephen H. Spurr, Consulting Forester, Harvard Forest, Petersham, Massachusetts.
Territory: East and South.
Specialization: 4, 15, 17. Also forest aerial photography.

Everett R. Stanford, Consulting Forester, 409 North Atlantic Boulevard, Alhambra, California.
Territory: Southern California; mountain watersheds, recreational areas.
Specialization: 1, 5, 6, 7, 18. Also forest watershed management, erosion control, mountain fo... home sites, forest park planning and management, structural pest control.

T. J. Starker and Son, Route 4, 3755 Van Buren Street, Corvallis, Oregon.
Consultants: T. J. Starker, Bruce Starker.
Territory: Oregon, Washington.
Specialization: 1, 3, 4, 10, 16, 19, 21.

E. A. Sterling, 39 Lake Avenue, Montrose, Pennsylvania.
Territory: No regional limits, but active mainly in the South.
Specialization: 3, 4, 6, 13, 15, 16, 17, 18, 19.

Raymond E. Stevens, Consulting Forester, 419 Lyceum Building, Duluth 2, Minnesota.
Territory: Northern parts of Minnesota, Wisconsin, Michigan.
Specialization: 4, 15, 16, 17, 18.

Charles H. Stoddard, Consulting and Operating Forester, Wolf Springs, Minong, Wisconsin.
Territory: Northern Lake states.
Specialization: 2, 4, 8, 10, 11, 13, 15, 16, 17, 18.

Errol Tarbox, Consulting Forester, 3 Carver Street, Sanford, Maine.
Territory: Southern Maine, New Hampshire.
Specialization: 4, 16, 17.

Vern H. Thaler, Consulting Farm Forester, 18912 Lindsay, Detroit 19, Michigan.
Territory: Southern Michigan, northern Indiana, Ohio.
Specialization: 4, 5, 6, 7, 9, 15, 16, 17, 18.

John F. Tillinghast, Consulting Foresters, Clothier, West Virginia.
Territory: West Virginia, eastern Kentucky, western Virginia.
Specialization: 3, 4, 6, 15, 16, 17, 18, 19, 20. Timber lands in coal producing areas a specialty; services available on job basis or on annual retainer fee basis.

Henry H. Tryon, Consulting Forester, 258 Mountain Road, Cornwall-on-Hudson, New York.
Territory: New York and New England.
Specialization: 3, 4, 10, 15, 17, 18. Also specializing in sprout hardwood region.

Myron S. Wall, Jr., Consulting Forester, 4612 Fegan Way, Sacramento, California.
Territory: California.
Specialization: 2, 3, 4, 6, 7, 10, 11, 15, 16, 17, 18. Also photo interpretation as applied to logging engineering, cruising, and mapping; timber sale supervision; scaling; and timber dispute arbitration.

Edward H. Werner, Consulting Forest Engineer, 1596 Broadway, Sacramento, California.
Territory: Northern California, except coastal area.
Specialization: 3, 4, 10, 16. Also timber and log procurement, timber sale and logging contract specifications, state forest practice act regulations, timber trespass and timber land damage claim valuation, and exchange or acquisition of timber and range lands.

J. Atwood Whitman, Consulting Forester, Glendon, North Carolina.
Territory: Southern states.
Specialization: 4, 15, 16, 17, 18. Also forest damage appraisal, growth analysis, timber type maps, and municipal forestry.

S. A. Wilde, Soils Department, University of Wisconsin, Madison 6, Wisconsin.
Territory: Wisconsin, Minnesota, Michigan, Missouri, Illinois, Indiana, Ohio.
Specialization: 18. Including survey of forest tracts, selection of planting sites, management of forest nursery soils.

Ellwood Wilson, Consulting Forester, Box 305, Knowlton, Quebec, Canada.
Territory: Ontario, Quebec, New Brunswick, Nova Scotia, eastern U. S.
Specialization: 2, 4, 13, 16, 18.

Richard E. Wilson, 126 Kelvin Place, Ithaca, New York.
Territory: Not restricted.
Specialization: 18. Establishment and care of plantations.

Donald W. Winters, Consulting Forester, 2138 Spruce Street, Murphysboro, Illinois.
Territory: Ohio, Indiana, Illinois, eastern Missouri, western Kentucky, and Tennessee.
Specialization: 4, 10, 13, 15, 16, 17, 18. Also valuation and appraisal of timberland for sale or purchase.

Kendall B. Wood, Consulting Forest Engineers, 108 Salmon Street, Terminal Building, Portland 4, Oregon.
Consultants: Kendall B. Wood, Spencer B. Gross.
Territory: Pacific Northwest.
Specialization: 2, 10, 16, 17.

James G. Yoho, Consulting Forester, 231 Elm Street, Nacogdoches, Texas.
Territory: Eastern Texas, Louisiana.
Specialization: 2, 3, 4, 5, 6, 7, 8, 10, 12, 13, 15, 16, 17, 18. Also forest mapping and timber estimating from aerial photographs.

Consulting Foresters are listed below according to the state in which each has headquarters.

Alabama
Pomeroy and McGowin

Arizona

Arkansas
T. F. Grayson and Company
Pomeroy and McGowin
Southwestern Forest Associates

California
Charles H. Bunting
California Foresteering
Forest Managers, Inc.
Emanuel Fritz
Hammon, Jensen, and Wallen
Ludwig Bros.
Everett R. Stanford
Myron S. Wall, Jr.
Edward H. Werner

Colorado
K. J. Helmick

Connecticut
Ralph C. Hawley
Donald K. Maissurow

Delaware

District of Columbia

Florida
Forest Managers, Inc.
T. M. Howerton, Jr.

Georgia
William H. Haley
The Langdale Company
T. A. Liefeld
Thomas A. McFarland
John G. Rawls Co.
Harold M. Sebring
Southern Foresters

Idaho

Illinois
Donald W. Winters

Indiana
Hayden E. Meeker, Jr.

Iowa

Kansas
George M. Fisher

Kentucky

Louisiana
Henry L. Bango
Clarence W. Griffith
John F. Kellogg
Frank J. Lemieux
Fred B. Merrill
Arthur D. Read

Maine
Philip T. Coolidge
Paul R. Dumas
Norman H. Gray
Earl M. McChesney
Prentiss & Carlisle Company, Inc.
James W. Sewall
Errol Tarbox

Maryland
James R. Simmons
Simmons & Stuart

Massachusetts
New England Forestry Foundation
Stephen H. Spurr

Michigan
Thomas F. Schweigert
Vern H. Thaler

Minnesota
William T. Cox
Wilfred H. Lauer, Jr.
Roy Dale Sanders
Raymond E. Stevens

Mississippi
Charles H. Stoddard
James W. Craig
Keith Cranston
Randle J. Dedeaux

Missouri

Montana
Hamilton D. Hill

Nebraska

Nevada

New Hampshire
Addis J. Christie
John B. Evans
H. Thorn King
A. Z. Nelson

New Jersey
Merton Henry
Wm. Mollenhauer, Jr.

New Mexico
W. T. Doherty

New York
Gordon Bowker
Allen W. Bratton
David B. Cook
David H. Hanaburg
Hiram L. Henderson
Richard F. Howard
George D. Hunter
LeRoy W. Huntington
David G. Jennings
Henry S. Kernan
Paul C. Lemon
Malcolm A. Milne
Pond & Moyer, Inc.
Henry H. Tryon
Richard E. Wilson

North Carolina
Gorham E. Jackson
Reed Forestry & Equipment Co.
J. Atwood Whitman

North Dakota

Ohio
John M. Crowl
E. V. Jotter

Oklahoma

Oregon
Bigley and Feiss, Foresters, Inc.
Gustaf W. Hult
R. Wilson Hutchison
Chas. O. Marston
Mason, Bruce, and Girard
Stuart Moir
Edgar J. Murnen, Jr.
T. J. Starker and Son
Kendall B. Wood

Pennsylvania
S. Gayley Atkinson
Reginald D. Forbes
LeRoy Frontz
Robert Moore
Lee H. Morrow
E. A. Sterling

Rhode Island
Monterey L. Holst

South Carolina
Travis M. Beeson
Jack C. Blakeney
E. C. Haff
Giles G. Hall
Robert K. Knoth & Company
A. F. Russell
C. H. Schaeffer
Samuel S. Snook
Seymour I. Somberg

South Dakota
Frank I. Rockwell

Tennessee
Green's Timber Service
M. E. Jelley
William J. Mills
H. C. Scott

Texas
N. D. Canterbury
Kenneth J. Morgan
Chris Nelson, Jr.
W. R. Owens, Jr.
Frank Spearey
James G. Yoho

Utah

Vermont
Halsey M. Hicks
Sable Mountain Corporation

Virginia
John D. Atkins, Jr.
Harrison V. Bailey
Winslow L. Gooch
Stuart G. Keedwell
R. B. Milne
Simmons & Stuart

Washington
Ace Engineers and Surveyors
Perry O. Donaldson & Associates
William A. Eastman, Jr.
L. D. Lloyd & Company
F. Douglas Mayor
Samuel A. Newman

West Virginia
John F. Tillinghast

Wisconsin
George Banzhaf & Company
S. A. Wilde

Wyoming

Canada
Belanger and Bourget
James D. L. Drake
John D. Gilmour
A. R. Gobeil
Leon A. Nix
Gustave C. Piche
C. D. Schultz and Co., Ltd.
James W. Sewall Company
Ellwood Wilson

Africa
Nils B. Eckbo

Announcement of Candidates for Membership

The following names of candidates for membership are referred to the membership for comment or protest. The list includes all nominations received since the publication of the December JOURNAL without question as to eligibility. Names, addresses, education, and endorsements are given. The names have not been passed upon by the Council. Important information regarding the qualifications on any candidate which will enable the Council to take final action with a knowledge of essential facts should be submitted before February 15, 1950. Statements on different men should be submitted on different sheets. Communications relating to candidates are considered as strictly confidential.

Allegheny

Junior Membership

Armstrong, F. H., Forester, U. S. Army, Phila., Pa.; W. Va. Univ., B.S.F., 1949; Yale, M.F., 1949. H. H. Chapman,, E. V. Zumwalt, R. W. Hess.

Appalachian

Junior Membership

Boyce, S. G., Grad. Student, N. C. State, Raleigh, N. C.; N. C. State, B.S.F., 1949. C. M. Kaufman, G. K. Slocum, W. D. Miller.

Central Rocky Mountain

Junior Membership

Grover, J. D., Forestry Aide, U.S.F.S., Laramie, Wyo.; Mich. State, B.S.F., 1948. K. Dressel, P. Herbert, P. W. Robbins.

Moon, G. C., Asst. State Forester, Pierre, S. D.; Univ. of Mont., B.S.F., 1949. H Woodward, M. J. Webber, E. R. Lepley.

Smith, J. E., Research Forester, Rocky Mt. Forest & Range Exp. Sta., Fort Collins, Colo.; Colo. A & M., B.S.F., 1949. J. L. Deen, J. V. K. Wagar, C. H. Wasser.

Central States

Affiliate Membership

Tretter, E. E., Dist. Fire Warden, Ind. Forestry Div., Indianapolis, Ind. Central States.

Junior Membership

Haskell, T. J., Student, Mich. State, East Lansing, Mich.; Mich. State, B.S.F., 1949. P. A. Herbert, K. Dressel, P. W. Robbins.

Preston, R. J., Div. Forester, Ohio Edison Co., Akron, Ohio; Mich. State, B.S.F., 1924. Reinstatement.

Columbia River

Junior Membership

Chamard, R. R., Forestry Aide, U.S.F.S., Prineville, Ore.; Oregon State, B.S.F., 1949. J. R. Dilworth, R. A. Yoder, W. F. McCulloch.

Hansen, G. M., Trad. Ext., West Coast Lbrmn's Assn., Portland, Ore.; Oregon State, B.S.F., 1939. Univ. of Calif., M.F., 1941. E. H. MacDaniels, N. E. Zinklund, A. K. Roberts.

Loomis, R. M., Forester, U.S.F.S., Prineville, Ore., Univ. of Mich., B.S.F., 1948. S. T. Dana, L. J. Young, S. W. Allen.

Gulf States

Affiliate Membership

Kennedy, D. P., Gen. Supt., Hillyer Deutsch Edwards Co., Inc., Oakdale, La. Gulf States.

Junior Membership

Cooper, J. W., Asst. Forest Supv., U.S. F.S., Jackson, Miss.; Univ. of Ga., B.S.F., 1932. Reinstatement.

Gayle, James A., Asst. County Agent, L.S.U. Agric. Ext. Service, Minden, La.; La. State, B.S.F., 1948. R. T. Wall, J. H. Kitchens, Jr., W. C. Valentine.

Kentucky-Tennessee

Junior Membership

Brandau, W. H., Forestry Aide, U.S.F.S., Winchester, Ky.; Iowa State, B.S.F., 1940. N. D. Shirley, F. H. Sipe, H. L. Borden.

Guthrie, J. D., Forester, T.V.A., Norris, Tenn.; N. C. State, B.S.F., 1949. C. C. Tropp, C. R. Page, Jr., J. W. Lehman.

New York

Associate Membership

Fraser, Donald A., Forest Ecologist, Forest Insect Lab., Dept. of Agric., Sault Ste Marie, Canada; Univ. of Toronto, B.A., 1940; Ph.D., 1949. New York.

Junior Membership

Sowinski, E. S., Creosote Sales, Allied Chem. & Dye Corp., N. Y., N. Y.; Yale, M.S.F., 1949. G. A. Garratt, F. F. Wangaard, F. E. Dickinson.

Northern California

Junior Membership

Coleman, G. A., Cruiser, McCloud River Lbr. Co., McCloud, Calif.; Univ. of Calif., B.S.F., 1949. R. N. Colwell, M. Krueger, F. S. Baker.

Hundt, J. R., Draftsman, McCloud River Lbr. Co., McCloud, Calif.; Univ. of Calif., B.S.F., 1949. R. N. Colwell, M. Krueger, F. S. Baker.

Kirchner, W., Forestry Aide, U.S.F.S., Quincy, Calif.; Oregon State, B.S.F., 1949. B. S. Sweatt, E. A. Drown, C. L. Peckinpah.

Mullen, A. H., Forestry Aide, U.S.F.S., Greenville, Calif.; Oregon State, B.S.F., 1949. C. B. Scholberg, L. E. Beltz, R. W. Bower.

Wilson, H. E., Weather Officer, U. S. Air Force. McClellan, Calif.; Univ. of Calif., B.S.F., 1947. F. S. Baker, M. Kreuger, J. L. A. Zivnuska.

Ozark

Associate Membership

Krusekoff, H. H., Prof. of Soils, Univ. of Mo., Columbia, Mo.; Univ. of Mo., B.S., (Agric.), 1908; Univ. of Ill., A.M., 1916. Ozark.

Member Grade

Burns, P. Y., Asst. Prof. Forestry, Univ. of Mo., Columbia, Mo.; Univ. of Tulsa, B.S., (Botany), 1941; Yale, M.F., 1946; Ph.D., 1949. Ozark (Jr. Member,, 1946).

Puget Sound

Junior Membership

Flower, L. E., Dist. Asst. Forester, U.S. F.S., Mineral, Wash.; Univ. of Wash., B.S.F., 1949. W. H. Vallad, R. L. McNeil, V. W. Bousquet.

Johnson, W. H., Asst. Forest Supv., Snoqualmie Natl. Forest, Seattle, Wash. Puget Sound.

Kansky, G. W., Asst. Dist. Rgr., Chelan Natl. Forest, Twisp, Wash.; Iowa State, B.S.F., 1938; M.S., 1940. L. L. Bernhard, D. W. Wilson, R. S. Rummell.

Southeastern

Affiliate Membership

Freeman, E. M., Dist. Forest Rgr., Gulf States Paper Corp., Tuscaloosa, Ala. Southeastern.

Loper, E. E., Procurement Supt., Div. of Forestry, Gulf State Paper Corp.,, Tuscaloosa, Ala. Southeastern.

Member Grade

Kirkpatrick, J. C., Gulf States Paper Corp., Tuscaloosa, Ala. Southeastern (Jr. member, 38R48).

Washington

Junior Membership

Gee, M. A., Asst. Chief, Div. Wildlife Mgmt., U.S.F.S., Washington, D. C. B. K. Payne, W. L. Dutton, L. W. Swift.

Forestry News

Compiled by ROBERT D. HOSTETTER, *Assistant Executive Secretary*

Southern Forestry Commission Plans Regional Collaboration

Estimating that 300 forestry graduates will be employed annually in the South during the next five years, a 15-man Commission on Forestry which met on November 14 and 15 in Atlanta, Ga. recommended that forestry schools constantly strive to improve the quality of instruction offered and to cooperate with each other in providing adequate training in all phases of forestry.

Headed by Dr. C. F. Korstain, the commission reviewed present facilities and future needs, making recommendations to the Board of Control for Southern Regional Education concerning ways by which forestry education in the South could be aided.

Acording to the commission, many possibilities for mutual benefit lie within the processes of regional collaboration. Specific arrangements for such cooperation will be discussed at a later meeting of the commission.

Commission members present were Willis M. Baker, director, Division of Forestry Relations, Tennessee Valley Authority; H. D. Bennett, forester, Appalachian Hardwood Producers, Inc.; C. A. Connaughton, director, Southern Forest Experiment Station; Charles H. Flory, South Carolina State Forester; A. D. Folweiler, director, Texas Forest Service; W. C. Hammerle, forester, Southern Pine Association; Ralph Hayes, director, School of Forestry; Louisiana State University; W. R. Hine, assistant regional forester, U. S. Forest Service; Robert D. Hostetter, assistant executive secretary, Society of American Foresters; C. F. Korstain, dean, School of Forestry, Duke University; H. J. Malsberger, forester, Southern Pulpwood Conservation Association; Harold S. Newins, director, School of Forestry, University of Florida; R. J. Preston, director, Division of Forestry, North Carolina State College; J. Herbert Stone, regional forester, U. S. Forest Service; and Donald J. Weddell, dean, School of Forestry, University of Georgia. A. E. Ziegler, University of Florida, also attended.

Mosquitoes Resist Control

Mosquitoes resistant to DDT have been found along the eastern coast of Florida. Several new insecticides are being tested, some of which show promise.

Trees and Prosperity Theme For Forestry Conference

"Southern Prosperity From Growing Trees" is the theme of the Southern Forestry Conference to be held on February 17 and 18 in Jacksonville, Fla. with headquarters at the George Washington Hotel.

Marcel Leloup, director of the Forestry and Forest Products Division of the Food and Agriculture Organization of the United Nations is to be the keynote speaker. Governor Fuller Warren of Florida will also be a featured speaker.

The conference is sponsored by the Forest Farmers Association, Valdosta, Ga.

F. W. Reed (1877-1949)

Franklin Weld Reed, former executive secretary of the Society of American Foresters who retired in 1936, died at Bradford, Vt., on November 26. Following cremation of his body, his ashes were interred at Raleigh, N. C.

Born May 11, 1877 in Massachusetts, Mr. Reed spent two years at Harvard, class of 1898, then completed the course at the Biltmore Forest School in North Carolina.

Appointed in 1902 as forest assistant in the Bureau of Forestry, now the Forest Service, he was advanced to associate district (now regional) forester at Ogden, Utah in 1910, and a year later was named forest inspector in the Branch of Operation at Washington, D. C.

In 1913 Mr. Reed resigned to become forester for the Indian Service, U. S. Department of the Interior, but returned to the Forest Service the next year as assistant district forester of the new eastern district, becoming district forester in 1919.

Again leaving the Forest Service in 1924, he engaged in private consulting practice until 1928 when he went with the National Lumber Manufacturers Association.

In April 1931 W. R. Hine, forced by poor health to resign as executive secretary of the Society of American Foresters, was succeeded by Mr. Reed. After five years as executive officer for the Society, Mr. Reed also experienced bad health and retired at the end of 1936.

Mr. Reed joined the Society in 1904, and in recognition of his services to the profession was made a life member in 1937 by action of the Council.

Wilm Heads Survey Group To Study Columbia Basin

Heading a new division of flood control surveys at the Pacific Northwest Forest and Range Experiment Station, Portland, Ore. is Harold G. Wilm, an associate editor of the JOURNAL OF FORESTRY.

He has had previous experience in watershed research for the U. S. Forest Service in the California, Rocky Mountain, and Southern regions.

Th new flood control division will take part in a survey of the Columbia River Basin undertaken by the U. S. Department of Agriculture. In addition to studying flood problems and possible remedies in a portion of the basin, the Portland group will coordinate the activities of other survey groups and will be responsible for preparing a report on the basin as a whole. The survey is expected to require two years.

Forest Soil Problems Aired

At the Soil Science Society of America meetings in Milwaukee on October 25 to 28, the forest soils subsection held an all-day session at which papers were presented on various aspects of soils in relation to forest types and rate of growth. Included also were such topics as oxidation-reduction potential of forest humus, mycorrhizae and phosphorus nutrition, soil structure studies, and hydrologic characteristics. Reports on forest humus classification, and current forest soils bibliography were given.

A panel on progress in forest soils research and a four-day post-meeting field trip led by S. A. Wilde were also featured.

N. C. State Gets Sawmill

The Turner Euipment Company of Statesville, N. C. and the International Harvester Company have donated $10,000 worth of equipment to the Division of Forestry at North Carolina State College, according to Dr. Richard J. Preston, Jr., division director.

A portable sawmill and edger was contributed by the Turner Equipment Company, and the International Harvester Company gave a diesel power plant. The two firms have also agreed to present newer models of this type of equipment as they are developed.

Federal Legislation

During the first session of the 81st Congress 10,627 bills and resolutions were introduced, over 3,000 in the Senate and over 7,000 in the House of Representatives. Of these, 440 were enacted into law.

About one-tenth of the introduced bills concerned some phase of conservation, and less than one-thirtieth of the conservation bills were enacted.

Newly enacted laws which are particularly concerned with forestry include:

P.L. 109, Reorganization Act of 1949 (H.R. 2361-S. 526).

P.L. 128, National Survey of Forest Resources (S. 979-H.R. 2001).

P.L. 171, National Housing Policy (S. 1070-H.R. 4009).

P.L. 348, Reforestation and Revegetation in National Forests (S.J. Res. 53).

P.L. 392, Federal-State Cooperation in Forestry Activities (H.R. 2296).

Fishing Institute Formed

A new organization called the Sport Fishing Institute, which has as its goal the improvement of fishing opportunities in the United States, has been incorporated in the District of Columbia.

The organization's program calls for the conservation and development of recreational fisheries resources; the advancement and encouragement of fishery research and management; collecting, evaluating, and publishing information on fishery science and fishing; assisting educational institutions in training personnel for fishery management; encouraging wider participation in sport fishing; and assisting and encouraging cooperative effort between existing conservation organizations. To carry on this extensive program, the Institute will obtain the services of a conservation director of national reputation and wide experience to head its research and management activities.

Wood Waste Uses Listed

"Wood Waste Utilization," published as Bulletin No. 30 by the Northeastern Wood Utilization Council, P. O. Box 1577, New Haven 6, Conn., is available from that organization for $1.00.

Over a dozen present and possible uses are briefly described, and details of a New England wood waste survey are given.

Moen Sets Bucking Record

George Moen of Grisdale, Wash. became the world champion bucker last summer by sawing through a 30-inch, turned Douglas-fir log in 1 minute, 50.3 seconds.

Clyde S. Martin Selected As A.F.P.I. Vice President

Clyde S. Martin, whose term as president of the Society of American Foresters has just ended, was elected vice president of American Forest Products Industries, Inc. on November 2. The new president of A.F.P.I. is N. F. McGowin of the W. T. Smith Lumber Company, Chapman, Ala.

William B. Greeley was re-elected as chairman of the board of trustees; Walter J. Damtoft was re-elected as a vice president; and Charles A. Gillett will continue to serve as secretary.

Park Travel Breaks Records

The number of visitors to the national parks and other areas administered by the National Park Service broke all record again last year, Director Newton B. Drury has reported. Total travel for the year (which runs from October 1 to September 30) amounted to 31,864,180, eight percent more than in 1948.

Among the 28 national parks, the Great Smoky Mountains, in Tennessee and North Carolina, led with 1,510,636. Four other national parks passing the million mark were Rocky Mountain (Colo.) with 1,138,162 visitors; Yellowstone (Wyo.-Mont.-Idaho) with 1,133,516; Platt (Okla.) with 1,106,475; and Shenandoah (Va.) with 1,102,797.

Dawn Redwood Seeds Offered

Dr. Ralph W. Chaney, professor of paleontology at the University of California, brought some seeds of the dawn redwood (*Metasequoia glyptostroboides*) from China and has arranged for their distribution through Herbst Brothers, 92 Warren Street, New York 7, N. Y.

A limited supply is available in packets of about 20 seeds which may be had by making a donation of $1.00 or more to the "Save-the-Redwoods League," to whose order checks should be drawn.

Although the existence of living dawn redwoods in China came to public attention only recently, this ancestor of the California redwood had been identified from fossils long before.

Federal Sustained Yield Unit Established at Grays Harbor

Approval on November 2 of the Grays Harbor federal sustained yield unit marks the inauguration of a new means of insuring a continuous supply of forest products to wood users on the Olympic peninsula in Washington.

Lyle F. Watts, U. S. Forest Service chief, approved the agreement which will have the effect of allocating national forest timber tributary to Grays Harbor to the local communities for primary manufacture. This approval was given after study of the record of the public hearing which was held in Aberdeen, Wash., on August 2.

No private timber is "pooled" in the Grays Harbor unit as was the case in the Shelton cooperative sustained yield unit.

About 94 percent of the newly established unit consists of virgin stands of Douglas-fir, western redcedar, Pacific silver fir, Sitka spruce and other species. Estimated annual yield is 60 million board feet per year from the 116,583 acres in the unit.

Southern Tree Farms Get Signs

More than 1,500 green and white porcelain signs are being distributed over the South by the Southern Pine Association.

The signs will mark privately-owned timber tracts where owners are carrying on sound forestry practices. The Tree Farm System is conducted within the states by local forestry agencies, usually with both state and private organizations working together. The local sponsors establish standards, inspect recommended tracts, and arrange dedication ceremonies. Nationally the program is sponsored by American Forest Products Industries, Inc., while in the South it is promoted by the Southern Pine Association. The total Tree Farm acreage in the South has reached 11,493,311 acres, representing 1,204 different ownerships.

Cunningham Extends Forestry

Gordon R. Cunningham has been appointed assistant extension forester at the Illinois College of Agriculture, Urbana.

In announcing the appointment, Dr. J. N. Spaeth, head of the Department of Forestry, said that Cunningham would spend his time in adult forestry extension work and would be available for county-wide and individual forestry meetings.

Hopp Aids Collaborators As Biometrical Consultant

Henry Hopp, formerly with the Soil Conservation Service, is now biometrical consultant with the Office of Foreign Agricultural Relations, U. S. Department of Agriculture, in connection with the technical collaboration program of the United States with other countries.

Last fall he visited El Salvador and Guatemala, and he will be in South America in the early part of 1950.

The technical collaboration program is underway in eleven Latin American republics where projects have been undertaken that are concerned mainly with crops complementary to the economy of the United States.

Mr. Hopp advises on the efficiency of biological measurement procedures in the planning and extension of research.

Forestry Articles Get Results

Ellwood Wilson, a consulting forester of Knowlton, Quebec, for the past six years has been writing popular forestry articles for a semi-monthly newspaper published by Southern Canada Power Co., Ltd. The paper, called "Contact," goes to 57,000 people.

Mr. Wilson's articles on such subjects as forest measurements, oak silviculture, forest laws, and practical problems of forest management have been instrumental in starting two town forests and in encouraging many woodlot owners to commence planting trees.

The paper is printed in both French and English and is used to teach French to forestry students at the University of Toronto.

Southern Canada Power Co., Ltd. plants about 160,000 trees annually from its own nurseries on its forest lands which are managed for sustained yield.

Memorial Forest Established

Dedication of an 80-acre forest as a living memorial ended the year-long celebration of its 100th anniversary by the University of Wisconsin.

The Centennial Forest will be used for conservation teaching in addition serving its historical purpose of calling attention to the part forests played in establishing the original trust funds of the University.

Anderson Receives Promotion

Bernard A. Anderson, above, for the past 7½ years assistant to the Chief of Operation in Region 4 of the U. S. Forest Service at Ogden, Utah has been promoted to the position of executive assistant to the U. S. Department of Agriculture representative on the Columbia Valley Inter-Agency Committee, according to a statement by W. B. Rice, Regional Forester. Mr. Anderson's headquarters is at Portland, Ore.

Sites Available at Anchorage

Two thousand acres of land near Anchorage, Alaska which were formerly held in the Fort Richardson Reservation were recently released for homesteads, business sites, home sites, or recreational sites.

Inquiries should be addressed to Regional Administrator of the Bureau of Land Management, Lowell M. Puckett, Federal Building, P. O. Box 480, Anchorage, Alaska.

Anchorage now has more than four times its 1940 population of 4,000.

Campfire Permits Required

A bill to make it unlawful to build a campfire on privately owned land without first obtaining written permission of the owner has been signed into law by Governor Earl Warren, of California. The measure exempts camp sites and special areas established by property owners and posted for camping.

Record Spruce Located

According to the forestry division of Michigan's conservation department, the largest white spruce in the United States is on the Copper Range Company's tree farm on the upper peninsula.

The tree is eight feet, nine inches in circumference.

South Dakota Assigns Four Assistant State Foresters

The South Dakota Game, Fish and Parks Commission has recently announced the appointment and assignment of four assistant state foresters to work under the direction of Harry R. Woodward, state forester. They are: Walter J. Fillmore, in charge of timber management; Gareth C. Moon, in charge of fire protection; M. K. Meines, in charge of tree distribution; and Walter E. Begalka, in charge of park development.

Fillmore is a native of Minnesota and a graduate of the University of Minnesota. He is charged with the management of some 150,000 acres of State-owned timberland. He is assisted by Reuben Hoffman, timber management assistant, a graduate of Utah State Agricultural College.

Moon is a native of Sioux Falls, S. D. and graduated in 1949 from the University of Montana. He has charge of the fire protection on one million acres of state and private lands situated largely in the Black Hills area.

Meines is a Nebraskan who has some twenty years' experience in nurseries, including the Bessey Nursery (U.S.F.S.) at Halsey, Nebr. Meines has charge of the distribution of shelterbelt and windbreak trees to the farmers of South Dakota, and his responsibilities include all farm forestry activities in the State.

Begalka is a native South Dakotan with many years' experience in the growing and propagating of trees in the plains area. He has charge of the planning and development of some seven state parks, nine recreation areas, and twenty-three recreation development areas. Begalka's charge includes five Park Development Districts, each of which is headed by a district park supervisor.

Efficiency Saves $2 per Cord

Ralph G. DeMoisy reports that a net saving of over $2.00 per cord is effected when lodgepole pine is logged in long lengths and bucked into 90-inch bolts at the mill as compared with woods bucking. Felling trees either directly toward or away from the skid roads increased production by 50 percent on the Biles-Coleman Company's operation. Each tractor turn is handled with slings as a unit in loading trucks. The slings remain with the bundle until it is unloaded.

Back row, left to right, Erdman West, Jr., Florida Forest Service; Russell Clapper, Division of Forest Pathology, USDA; Ronald Craig, Lake City Branch Station; J. E. Turner, Florida Forest Service; A. G. Snow, Jr., Lake City Branch Station; L. T. Nieland, Florida Extension Forester; C. Dorsey Dyer, Assistant Georgia Extension Forester; W. M. McComb, Georgia Forestry Commission. *Middle row*, Ralph Clements, Lake City Branch Station; James Snowden, Lee M. Powers, E. A. Schluter, Tony Jensen, and H. L. Sudduth, Florida Forest Service; George Gruschow, Lake City Branch Station. *Front row*, A. H. Antonie, and Jim Coad, Georgia Department of Forestry; Frank Hill, Dale Dougherty, Wyman Garland, and Walter Martin, Florida Forest Service.

Farm and Extension Foresters Meet at Lake City Station

Eighteen farm foresters and extension foresters, pictured above, from Florida and southern Georgia were visitors to the Lake City, Florida, Branch of the Southeastern Forest Experiment Station on November 3 and 4. The purpose of their annual meeting with the staff of the Lake City Branch is to coordinate forest research, extension, and technical assistance to forest owners.

The group reviewed progress in chemical stimulation of gum flow, and in new equipment for turpentine operators. A new spiral gutter for use on the rounded faces of bark-chipped trees was demonstrated, along with several combinations of a plastic sulfuric acid sprayer attached to a bark chipping hack.

The foresters also observed the timber management systems applied on the 36 forty-acre compartments on the Olustee Experimental Forest. A high point of the meeting was provided by the annual review of developments on the Olustee Farm Woodlot. This model woodlot shows how a farmer can use his slack time to make an annual harvest from his woodlot while building up its productivity through good forestry measures.

Georgia Lifts and Ships Forty Million Seedlings

The record crop of approximately 40 million forest tree seedlings produced this year at the Georgia Forestry Commission nurseries will probably establish a new, all time high for seedling output from a State nursery in a single year in the South.

L. C. Hart, Jr., assistant director of the Georgia Forestry Commission, who is in charge of the nursery program, said that lifting and shipping of seedlings to landowners began in November.

Losses by insects and disease account for a decrease in production from an originial goal of 55 million seedlings.

Ford Forestry Curtailed

Ford Motor Company has largely curtailed its lumbering operations in the upper peninsula of Michigan due to lessened requirements for wood in the construction of present-day automobiles, station wagons, and trucks.

Rotty Moves to Washington

Roland Rotty, supervisor of the Coconino National Forest in Arizona since 1947, has been transferred to the Washington, D. C. office of the U. S. Forest Service where he will be in the cooperative forest management division of the branch of state and private forestry.

After receiving his degree in forestry from Iowa State College in 1928 he joined the Forest Service as an assistant ranger on the Uncompahgre National Forest in southwestern Colorado. Subsequently he was a timber cruiser on the Chippewa and Superior Forests and district ranger on the Nebraska and the Medicine Bow Forests. In 1936 he went to Region 3 to build and operate a nursery and conduct the Region's CCC reforestation program. During the war he was with the guayule rubber project, returning to the Supervisor's staff of the Coconino Forest when that project was ended.

Natural History Society Commemorates Anniversary

A 32-page booklet, "Nature in the San Diego Region," prepared by the San Diego Society of Natural History, was distributed in October as part of the commemoration of that organization's seventy-fifth anniversary. The booklet is a "pictorial and descriptive presentation of the varied and interesting natural life" to be found in the Southwest. It also directs attention to the work and services of the organization and the Natural History Museum which it maintains in Balboa Park, San Diego, Calif.

Arthur F. Fisher, a Fellow of the Society of American Foresters, is the director of the museum.

California Foresters Honored

DeWitt Nelson, California state forester; Charles J. Kraebel of the California Forest and Range Experiment Station; and Perry A. Thompson, California regional forester, were presented with certificates of special recognition and honor on November 15 by the California Conservation Council "for furthering conservation education and the wise use of California's great natural resources."

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Cliff Succeeds Spencer As USFS Regional Forester

Succeeding John W. Spencer, who retired as regional forester of the Rocky Mountain Region on December

EDWARD P. CLIFF

31, is Edward P. Cliff. Mr. Cliff was formerly assistant regional forester in charge of range and wildlife management for the Intermountain Region, with offices in Ogden, Utah.

A 1931 graduate of Utah State Agricultural College, Mr. Cliff has had wide experience in national forest administration in the Northwest and in the Rockies. In announcing his appointment, Lyle F. Watts said, "Mr. Cliff is a capable administrator who understands the needs of the water-user, the ranchman, the lumber and pulp industry, the sportsman, and the vacationist."

Mr. Spencer, a former S.A.F. Council Member, has completed nearly 40 years with the U. S. Forest Service, 25 of which were in the Denver regional office.

Fire Line Mileage Lessened

Extension of organized forest fire protection and improved fire prevention and suppression techniques have made it possible for the Florida Forest Service to reduce the amount of plowed protective fire lines needed, according to Owen R. Douglass, fire control chief. However, from August 1949 to March 1950 fire lines long enough to reach one-third of the way around the world will be plowed by the Florida Forest Service's 12 tractors. Each tractor and plow builds about 20 miles of protective fire line per day.

Tennessee Valley Forest Products Worth 20 Million

More than 150 products made from wood, having a combined value exceeding $200,000,000, were manufactured or processed by forest products industries in 1946 in the 125 counties in the Tennessee River watershed, according to a report prepared by the Tennessee Valley Authority in cooperation with the U. S. Bureau of the Census.

The 5,634 sawmills produced $62,000,000 worth of lumber and ties while the products of the 1,239 other forest-products plants were valued at $190,000,000. Posts and fuelwood are not included. The six pulp and paper mills in the Valley accounted for 21 percent of the total products value.

Detailed information by counties is contained in the recently released "Statistical Summary of Forest-Products Industries in the Tennessee Valley."

Mechanization Ideas Pictured

Lowering the cost of wood transportation from stump to mill by northern loggers is the theme of a new 12-page booklet, "Mechanizing the Northern Woods," by Caterpillar Tractor Co.

Applications of increased log production ideas are illustrated with photographs of actual operations in the northern United States and Canada.

Copies of this booklet may be secured by requesting Form 12540 from Caterpillar Tractor Co., Peoria 8, Illinois or by contacting any local Caterpillar dealer.

Kurth Named Man of Year

Ernest L. Kurth, Texas lumberman and industrialist, was recently named the South's "Man of the Year." He established the Southland Paper Mills at Lufkin, Tex. to make newsprint from southern pine.

A former president of the Southern Pine Association, he was one of eight Americans who attended the international Forestry Conference in Budapest in 1936.

Fellowships Awarded

Robert H. Ruth has been awarded the $1000 Weyerhaeuser Fellowship in forest management at Oregon State College for the current academic year, and Myron B. Savage received a similar fellowship at the University of Washington.

Foresters, Pulpwood Producers Discuss Best Logging Methods

More than twenty foresters and pulpwood procurement or producing operators discussed "Growing and Harvesting Pulpwood Crops" at the meeting of the Southern Technical Committee of the American Pulpwood Association at Moorehead City, North Carolina, on October 11 and 12. Kenneth Trowbridge of the North Carolina Pulp Company developed the program.

J. B. Johnson of the Camp Manufacturing Company and chairman of the Southern Technical Committee, called on J. H. Johnson, forester of the Chesapeake Corporation, to discuss the program of land reclamation of his company. This group showed great interest in the manner in which the Chesapeake Corporation is successfully eliminating undesirable hardwood species and preparing desirable seed bed conditions for the regeneration of pine. This is being done by using heavy bulldozers to push over the hardwood trees and brush of poor form and to expose the mineral soil.

Discussions of the best logging practices for harvesting pulpwood under clearcutting and selection cutting methods or when making thinnings or improvement cuttings were led by foresters of participating companies. Included were: Joseph Ennis, Champion Paper and Fibre Company; F. C. Gragg, International Paper Company; Frank A. Elliott, Johns-Manville Corporation; George Anderson, Brunswick Pulp and Paper Company; Peter Lannan, West Virginia Pulp and Paper Company; and W. J. Crumpacker, Union Bag and Paper Corporation.

American Deer and Beaver Thrive in Finnish Habitat

Eight American beavers and four whitetail fawns supplied in 1937 by Dr. Gardiner Bump, then of the New York Conservation Department, have successfully multiplied in Finland. The beavers now number 500 and are the basis of a new fur industry in that country. The fawns, supplemented by five more from Minnesota since the war, have increased to 150 head, according to Dr. Bump who visited Finland recently.

The Finns are planning to trap 200 black grouse and capercaillies and send them to Dr. Bump who is now with the U. S. Fish and Wildlife Service.

Supervises Michigan Forest

C. Lewis Harrison, above, was appointed supervisor of the Upper Michigan National Forest on December 1. He succeeds Paul A. Wohlen who has retired.

Mr. Harrison has had wide experience in the Central Rocky Mountains and in the North Central States. Prior to his latest move he was on the Wayne National Forest in Ohio.

Wright Supervises San Juan

Edward Wright has been transferred to the position of supervisor of the San Juan National Forest in Colorado. Harvey O. Robe will succeed Mr. Wright as supervisor of the Gunnison National Forest.

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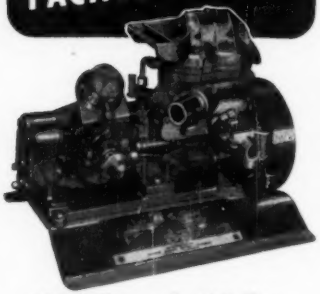

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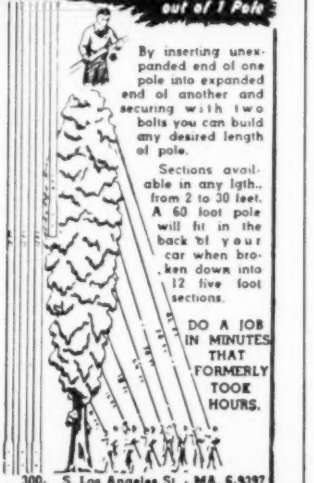

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Forestry Schools Conducted For Assistant County Agents

Five one-day forestry schools for assistant county agents of the Clemson College Extension Service were conducted in South Carolina during November, W. J. Barker, leader of Clemson forestry extension work, reports.

The program included a discussion of the joint efforts of the Extension Service and the State Commission of Forestry in the educational and service phases of the forestry work with individual landowners in South Carolina.

The agents also participated in demonstrations in care and planting of pine seedlings, fence post treating, timber thinning, and marking and measuring trees for harvest.

Edmund Secrest (1882-1949)

Edmund Secrest, former Ohio state forester and director of the Ohio Experiment Station, died on November 28, 1949 at the age of 67.

Dr. Secrest first became associated with the station at Wooster, Ohio in 1906 following three years with the federal forestry bureau. He graduated from Kansas State College in 1902.

He was appointed state forester of Ohio in 1921 and was a charter member of the Association of State Foresters, meanwhile continuing his work at the experiment station, of which he became director in 1937, retiring ten years later.

His work in farm forestry and in establishing experimental plantings on various soil types is well known.

At the time of his retirement, the *Wooster Daily Record* said,"The state of Ohio owes a great debt of gratitude to this outstanding forester, whose career here has bridged the whole history of state forestry.

Marks Killed by Falling Snag

Elmer B. Marks, district ranger on the St. Joe National Forest, was killed by a falling snag near Clarkia, Idaho on August 12, 1949.

A 1931 forestry graduate of the University of Minnesota, he spent his entire career in the employment of the United States Forest Service. He worked successively on the Cabinet, Kootenai, Coeur d'Alene National Forests, at the Northern Rocky Mountain Forest and Range Experiment Station, and on the St. Joe.

H. T. Gisborne (1893-1949)

Harry T. Gisborne, fire control research specialist for the U. S. Forest Service, succumbed to a heart attack while inspecting the Mann Gulch burned-over area on the Helena National Forest on November 9, 1949. He and Forest Ranger Robert Jansson

HARRY T. GISBORNE

were studying the scene of the disastrous fire where 13 men were killed last August to try to determine the cause of the unexpected blow-up and, if possible, develop criteria for dangerous situations that would help prevent future loss of life.

Considered one of American forestry's most distinguished scientists by Lyle F. Watts, Chief of the U. S. Forest Service, Mr. Gisborne was the first person to devote full time to forest fire control research. His fire danger meter and his methods for calculating fire hazards in forests are internationally known.

Shortly before his death he was working with Vincent Schaefer of General Electric on methods of preventing lighting fires by "seeding" thunderheads.

In 1947 he was awarded a silver medal by the Secretary of Agriculture in recognition of his achievements in forest fire control research.

Industrial Movie Released

"Daylight in the Swamp" is a new 17-minute, color-sound movie produced by Trees for Tomorrow, Inc., Merrill, Wis.

It depicts the part played by modern industrial forestry enterprises in forest management. Nursery operations, thinnings, and harvesting methods are pictured.

Positions Wanted

Duke School Forestry Graduate, B.S. 1946 M.F. 1947. One and a half years' experience as District Forester with State Division of Forestry; one year's experience as Manager of Forestry Department for one of the largest home-grown timber merchants in England. Returned to states in November and desires permanent position with forestry-minded company or State Conservation Agency. References and details forwarded on request.

Box O, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester, 23, married; graduate of Michigan State College, B.S. in 1948, and Duke University, M.F. in 1949. Six months' experience with U. S. Forest Service in forest soils research. Excellent background in mathematics. Desire permanent position as forester with forestry-minded company. References and details upon request. Lake States preferred.

Box A, Journal of Forestry, Mills Building, Washington 6, D. C.

Michigan State graduate, B.S.F., 1924. Sixteen years with U. S. Forest Service. Nine years forest management and administrative, 5 years timber production, and wood utilization, research; two years Forest Products Laboratory, softwood waste markets and utilization studies and low grade hardwood timber and log utilization research. Desire permanent position in forestry or wood utilization. References and details on request.

Box S, Journal of Forestry, Mills Building, Washington 6, D. C.

Michigan State College graduate, B.S., 1941 in Forestry and soils, desires position with private forestry organization. Fourteen months with U. S. Forest Service, 7½ years with mining and paper companies in Lake States, surveying, cruising, mapping, logging contracts, some experimental work. Detail's and references upon request.

Box P, Journal of Forestry, Mills Building, Washington 6, D. C.

Graduate Forester, 29, University of Minnesota, B.S., 1942 and M.F., 1948. Three years private industry in management, cruising, and logging supervision; 3 months landscaping. Data and references on request.

Box Q, Journal of Forestry, Mills Building, Washington 6, D. C.

Forestry graduate, 36, highly successful 15 year record in logging, timber management, and sawmill operation desires opportunity in lumber or paper manufacturing and business administration under top executives of aggressive company.

Box R, Journal of Forestry, Mills Building, Washington 6, D. C.

Forester with 6 years' experience in Liberia, Korea, and Japan, desires position in foreign forest production. Has B.S. and M.S. from Michigan State College and currently enrolled in special studies at the University of Michigan. Detailed information and references on request.

Box B, Journal of Forestry, Mills Building, Washington 6, D. C.

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Bethel Teaches Utilization At North Carolina State

Appointment of Dr. James Bethel, former plant manager of the Tidewater Plywood Company at Brunswick, Ga., as associate professor of forestry at North Carolina State college has been announced by Dr. Richard J. Preston, Jr., director of the college's Division of Forestry.

Dr. Bethel is a former faculty member at Pennsylvania State College and at Virginia Polytechnic Institute. He was educated at the University of Washington and at Duke University.

Dr. Bethel's appointment raises to four the number wood technologists who are now engaged in wood utilization instruction and research at North Carolina State College.

Vogt Writes Full Time

William Vogt, chief of the conservation section of the Pan-American Union since 1943, has submitted his resignation to devote full time to writing and lecturing on conservation issues.

Internationally recognized as one of America's leading conservationists, he is the author of the best-selling "Road to Survival." Mr. Vogt has played a prominent role in recent conservation meetings, and will serve as summarizer of the 15th North American Wildlife Conference, which will be held in San Francisco next March.

Skiers Use Aerial Tramway

An aerial tramway with self-propelled cars, the only one of its kind on the continent, is in use on the Mt. Hood ski area in Oregon. It operates over the 3.1-mile stretch between Government Camp and Timberline Lodge.

Because of too little snow in the Northeast and too much snow in the West last winter, the number of winter sports enthusiasts visiting national forest recreation areas dropped 31 percent from the preceding year's record of 2,724,900 winter visits.

Priest River Drive Ended

There will be no more log drives on the Priest River in northeastern Washington, according to Robert W. Billings, Diamond Match Company forester.

The colorful event, one of the last in the country, has been abandoned because that method was more costly than truck transportation.

Auburn Increases Faculty

The addition of Jack T. May and B. M. Cool to the faculty of the Alabama Polytechnic Institute Department of Forestry last fall increased to fourteen the number on the staff there.

Mr. Cool formerly was the state timber marketing specialist with the U. S. Production and Marketing Administration in Mississippi. He is teaching farm forestry and assisting in forest management.

Mr. May for many years was associated with the Southern Region of the U. S. Forest Service and is well known for his activities in forest nursery operation. He will provide technical assistance for the operation of the new forest nursery being established by the Division of Forestry of the Alabama Department of Conservation in cooperation with the Agricultural Experiment Station of the Alabama Polytechnic Institute. The nursery will have a maximum capacity of 6,000,000 seedlings.

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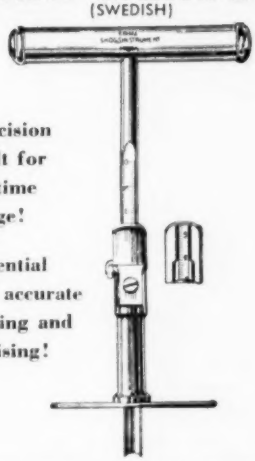

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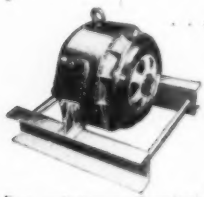

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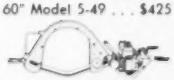

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